This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

S 7930.50

Harvard College Library

FROM THE BEQUEST OF

EDWARD HENRY HALL

(Class of 1851)

OF CAMBRIDGE

15/5

WHAT IS ADAPTATION?

BY THE SAME AUTHOR

AN INTRODUCTION TO BIOLOGY. For Students in India. With 15 Plates of Diagrams. 8vo, 5*s.* 6*d.* net.

THE GROWTH OF GROUPS IN THE ANIMAL KINGDOM. With 2 Coloured Plates. 8vo, 5*s.* net.

LONGMANS, GREEN AND CO.

LONDON, NEW YORK, BOMBAY, CALCUTTA, AND MADRAS

WHAT IS ADAPTATION?

BY

R. E. LLOYD, M.B., D.Sc. (LOND.)

MAJOR, INDIAN MEDICAL SERVICE

PROFESSOR OF BIOLOGY, MEDICAL COLLEGE, CALCUTTA

LONGMANS, GREEN AND CO.

39 PATERNOSTER ROW, LONDON

FOURTH AVENUE & 30TH STREET, NEW YORK

BOMBAY, CALCUTTA, AND MADRAS

1914

All rights reserved

S 7930.50
~~NH 3609.14.13~~

HARVARD COLLEGE
MAY 22 1915
LIBRARY.
Hall fund

PREFACE

THIS book is a sequel to another, published two years ago, under the title 'The Growth of Groups in the Animal Kingdom.' It is not, however, a continuation of the chief subject of the latter, but of a side issue. On the previous occasion, I expressed the opinion that adaptation did not, in itself, need explanation: but certain critics soon inculcated that it was unwise to make such an assertion, without properly defending it. Consequently, I shall here endeavour to show how the need for an explanation of adaptation has arisen, and why such an explanation seems unnecessary.

Some critics noticed that I was biassed against the selection theory. Indeed, I was careful to say so at the outset. 'No one should be biassed,' they advised; 'keep your mind open and wait for evidence.' But they fail to see that the selection theory, whatever its value, is the expression of a certain bias, a certain mental requirement, the need for an explanation of adaptation.

The tone of much of the criticism, directed against my last book, was as follows—"The selection theory is settled, you cannot alter it. If you have anything to say about evolution, you must take that theory for granted. Even the leaders of the mendelian school 'accept the

principle of natural selection in its wider import.'"* But this is, I think, far from true. They may perhaps accept the theory in its wider import, whatever that may be; but they do not accept it in itself, as their writings show.

What is the selection theory? It does not lie merely in the fact of evolution and in the fact of competition. It lies in the proposition that competition causes evolution and this proposition was made in order to explain adaptation and life in general. It regards organisms as fitting into something, which is called their environment; somewhat like the wax fits into a seal. It holds that every item in the organism has a corresponding item in the environment, and it holds that this correspondence was brought about by the elimination, from the one side, of all that would not fit. This is the selection theory as commonly understood and it is, I think, impossible for any one person to hold this theory and to believe in the origin from mutants at the same time. Origin from mutants is origin without selection. Darwin himself pointed this out. Some critics carelessly informed their readers that I was ignorant of the fact that Darwin admitted the origin from mutants. I have known it for the last twenty years and I was very careful to say that I knew it, on the second page of my book. Darwin finally admitted that groups of like organisms might sometimes arise directly from sports; but stated clearly that such events would occur "independently of natural selection." Selection among mutants does not explain adaptation in the least. That is why so many object to

* *Sociological Review*, July, 1913.

discontinuity in evolution. They need an explanation of adaptation. They see purpose, as a special human attribute, pervading all life and are perplexed thereby.

This book is an attempt to show how such perplexity may be overcome, and that there is nothing in adaptation to be explained. It is not scientific in the usual sense, being influenced considerably by M. Bergson's philosophy.

R. E. L.

MEDICAL COLLEGE,
CALCUTTA,
June, 1914.

CONTENTS

PAGE

INTRODUCTION 1

CHAPTER I

THE VARIOUS ASPECTS OF ADAPTATION

The relation between adaptation and contrivance, exemplified by contrasting fitness and growth 29

Adaptation causes wonder—The origin of the wonder, which is not universal 30

Adaptation in its more technical aspects—Adaptation and adaptability—Racial and individual adaptation—The difficulty of explaining the latter 32

The antiquity of adaptability—The personal need of explaining it . . 37

The impossibility of unadapted life—Is adaptation superimposed or inherent?—The view that it is superimposed exemplified and discussed—The view that it is inherent advocated, though contrary to the principles of modern science 40

Fitness as egoism 43

Fitness identified with the fact of survival 44

CHAPTER II

VARIOUS VIEWS OF LIFE

The variety of outlook—The idea of supernature is common to all—The broad distinction between definite and indefinite conceptions of supernature—The latter exemplified 45

Definite conceptions or explanations of life—Teleology, dominative theism, and the selection theory arise from a similar source and satisfy a similar need 49

Lamarck's view 54

CHAPTER III

THE ORIGIN OF THE NEED FOR EXPLANATION

PAGE

Purpose as human and purpose as vital—Fitness as an agency and fitness as a word—Is the need for explanation real or traditional? . . . 56

Teleology and the selection theory are to explain the resemblance between organisms and mechanisms—They therefore depend on the analogy of man the artificer—Hence both are mechanistic in basis—The difference between mechanistic and vitalistic outlook—The need for explanation arises from wonder at the resemblance between organisms and mechanisms and from nothing else—The mechanist subordinates the whole to the part, hence he is perplexed and needs explanation—The vitalist subordinates the part to the whole and is not perplexed 60

The unity of life, not yet fully admitted—The need for explanation is the result of not admitting it 65

The vitalistic outlook long established both in the West and the East . 66

CHAPTER IV

TWO VIEWS OF EVOLUTION, SUMMARY AND ACKNOWLEDGMENT

The two views of evolution, their incompatibility 68

Evolution analogous to constructive process, having therefore a cause and a climax—Evolution as reality without cause and climax . . 69

Summary of foregoing 73

Acknowledgment 78

CHAPTER V

EXPLAINING WITHOUT EXPLANATION

The difference between explaining and seeking for an explanation . . 82

Views of supernature—Attempts to know it—The principle of grouping —*Three important instincts or intuitions defined* 83

Preliminary defence of the principle of discontinuity as applied to intuition 86

PAGE

Preliminary account of the three intuitions as defined 87

Amplification of each in turn—The first—The second—The third . . 88

The appearance of the three intuitions in the development of the individual—A further defence of them—The second is dualism, the third is monism—The third intuition necessarily accompanies the realization of evolution 95

The importance of intuition in human life—The necessity of regarding it as discontinuous 100

Various objections considered—The conventionality of the terms birth maturity and species—Can what is here called intuition be implanted by teaching or imitation?—The phrase or means of expression is passed from man to man, but not the intuition—The same intuition may be expressed by two different phrases 103

The validity of these principles, viz. the importance of intuition and the necessity of regarding it as discontinuous, is already largely admitted—Examples of such admissions 105

Examples of the same intuition expressed by two different terminologies 106

INTRODUCTION

LIVING things are adapted to their surroundings. If they were not so they could not live. It is therefore impossible that they should be otherwise. All are agreed that adaptation is a primary condition of life. This fact, however, does not produce the same effect on all persons. To some, perhaps to most, it appears as a problem requiring solution. That it is possible to look at adaptation without seeing in it a problem, is a fact that needs emphasis.

There is no doubt that we shall gradually attain a deeper insight into life, but we do not know in the least the direction in which we shall move to attain it. It is, therefore, unwise to see a particular problem in that which we do not know, to ask ourselves a particular question concerning it. But this we do, whenever we regard adaptation as a problem. We ask the question—'How is it that the man-like activity called purpose is apparent in every phase of life?' It has long been the custom to ask this question, but it is doubtful whether it is more than a custom to do so, at the present day. It is by no means certain that the majority actually feel it as a problem.

There may be but few, who think definitely that adaptation is not a problem; but there is certainly a

tendency among modern biologists to turn from the subject, a feeling that discussion concerning it gives no result.

Some are fully satisfied with the theory of natural selection as an explanation of adaptation. Others, though less satisfied with this theory, defend it on the ground that it is the best available. They find in it a relief from a more obviously anthropic theism which is repugnant to them. But there is, I believe, a third party, who regard the whole subject with indifference and if their point of view were to be more fully expressed, it would be found that they had little or no curiosity concerning the cause of adaptation. This view has the disadvantage of being somewhat indefinite, but when it is supplemented by an understanding of how the problem of adaptation has arisen, it may develop into a conviction that adaptation is not a problem.

We shall consider, then, how the problem has arisen. It is evident that the idea of adaptation, suitability, or fitness, is very ancient, and it seems no less evident that the idea must first have arisen in connection with contrivance. There was a time when man first began to make things, and the things made must often have been related to his essential needs, just as a bird's nest is related to the need of its builder. The thought, expressed in the words suitable, useful or excellent, must first have arisen in connection with those implements that gave satisfaction and were therefore somewhat permanent. Subsequently, and probably at a much later date, man noticed a similarity between contrivances and organisms, a similarity arising from the fact that both were suited

to circumstances. This led to the view of God as artificer. It is difficult to say when this was first thought of. The idea is, of course, very old. Xenophon relates how he heard Socrates discoursing with a pupil about adaptation, " I no longer have any doubt, replied Aristodemus ; and, indeed, the more I consider it, the more evident it appears to me that man must be the masterpiece of some great artificer." [1] Although this idea is ancient, it does not appear very prominent until more modern times, as for example in the writings of Paley. Such doctrine is commonly termed teleology. Generally speaking, however, God is far more often represented in sacred writings as king or father, than as artificer.

If it had not been for teleology, it is evident that the theory of natural selection as an explanation of life would be meaningless. This has been emphasised by some of the most strenuous advocates of the selection theory, as well as by their opponents.

It may be that modern scepticism, concerning natural selection, is due to the fact that the younger generation were not sufficiently imbued with teleological principles in their early youth. It is certain that if the theory of selection is to be made intelligible to the fresh mind, the teacher must mention the idea of God as artificer, before introducing the spirit of competition as a substitute for that idea.

Let us take the case of a teacher of biology, whose duty it might be (under the regulations of some University) to introduce the theory of natural selection to minds free from philosophical perplexity. If he is to be intelligible, he must begin by describing adaptation, although

many of his listeners would be acquainted with it in a general way. He must then proceed to show how the theory affords an explanation. But if one of his audience asked why it was necessary to explain this obvious fact, he would find it difficult to reply. He might point out that they had come to him to be taught biology, and that to explain adaptation was one of the customs of that science. Perhaps this would be the best way out of his difficulty, for there is only one other reply, which would lead him into further difficulties. He might say,—'We require it as a substitute for the older explanation, according to which adaptation was caused by an invisible agency, which is comprehensible in so far as it is essentially man-like in ingenuity.' If to this the pupil replied—'But I was never able to believe *that*; of what use then is your substitute to me?' the teacher would find nothing more to say. He may regard such a state of mind as unnatural, because it is unlike his own. He may regard his pupil as insincere, as one purposely falsifying his thoughts in order to attract attention. It is often said that a person holds some such view, for the sake of being peculiar. The saying may be true so far as it goes, but it does not lessen the reality of mental differences. We can forgive anything but insincerity, says some critic, who is lenient to those who wander slightly from his own way of looking at things, but holds those who choose another path to be dishonest. He cannot be like that in reality, so unlike myself, he must be pretending. So we all think at times, when judging others. But let us return to the point under discussion, the meaning of the word adaptation and its equivalents, purpose, and design.

Some biologists assume a hostile attitude at the sound of the words purpose and design. For example, Adami defined inflammation briefly as "the local attempt at repair of an injury." Another author wrote in comment: "This definition as it stands seems to imply a purposive action which cannot be admitted." A dozen other examples might be chosen from modern biological literature to illustrate this hostile attitude. In defence of this attitude we are told that to admit design is to ruin science. But this means little. Science is an outcome of man's restless disposition and will therefore continue to flourish, more especially among those who live outside the tropics.

Let us see what we mean by purpose in the process of inflammation. A man, finding himself exposed to severe weather, will seek shelter. He becomes active in a certain manner for his own benefit. His action is described as purposive; it is, we may say, typically so. Now let us turn to the other case. A part of a living body, being injured, becomes active in a certain manner. This activity, which is inflammation, is for the benefit of the injured part. But we are told that this activity is not purposive. It is blameworthy to describe it as such. There is, perhaps, no need to assert that the damaged tissue behaves with purpose, but in my opinion, it is utterly unreasonable to assert that the man taking shelter was saved by purpose and at the same time to deny that the tissue was saved by purpose. There is an obvious similarity between the activity of the man and the activity of the tissue. Each behaved in its own manner, for the sake of benefit, in order to continue to

live. If we need a final cause, let us call it x, for the moment, and say that the man was moved by x and the tissue also moved by x, but let us not say that the man moved by purpose and the tissue not by purpose.

Some writers deplore the reintroduction of what they call the mystical element into scientific writings. Any objections brought against the current explanation of evolution are regarded as attempts to reinstate mysticism. The idea of fitness is the essence of the theory of natural selection; but since fitness is impersonal, some cannot see that it is an entity, as mystical as any other. They speak of fitness as though it were some reality, providing us with an explanation of evolution and adaptation, explaining itself perhaps.

But from the opposite point of view, the theory of natural selection, the basis of which is fitness, does not enlighten us. From this point of view it is inconceivable that there should be a knowable cause of life or evolution.

Those who seek to know the cause of life are under the influence of the thought that a mechanism must be the result of a maker or of a process of manufacture. The teleologist argues that because a watch has had a personal maker, therefore an organism must have had a personal maker. The selectionist argues that because a watch is the result of an intelligible process, therefore an organism must be the result of an intelligible process. *The difference between the two arguments is slight in comparison with the resemblance between them.*

The fact, that from his earliest days man made tools or simple contrivances, suggested to him that the world

must have been made, suggested both the idea of a maker and the idea of making by a process analogous to manufacture. The selectionist implies or even states that domestic pigeons are manufactured, in the sense that they come from the hands of the breeder. Hence, he argues, the same kind of manufacturing process is going on in nature.

Darwin wrote, "Man does make his artificial breeds, for his selective power is of such importance relatively to that of the slight spontaneous variations." [2] His meaning is plain. Selection, artificial or natural, is a constructive principle compared with spontaneity which is not a constructive principle. The argument turns on whether breeders make domestic animals or not, and the supposition that they do, arises from the conviction that the forms of life were constructed somehow. But this conviction is not universal, nor can it be acquired by education.

The acceptance of selection, as a universal constructive principle, follows necessarily from a belief in the breeder's omnipotence—a belief which is due to the need for such a principle, more than to experience. This is illustrated in the following passage, written last year by an eminent zoologist. "He (Darwin) found that there was no part of an animal or plant which could not be made to vary in any direction which man desired." [3] Judged from the standpoint of one who is in need of an explanatory principle, the above passage no doubt appears true, but judged merely as a statement of experience, by one who has no such requirement, it appears quite the reverse. Let us examine it for a moment.

There are an immense number of different animals and plants, *x*. The average number of 'parts' per individual is large, *y*. The directions of man's fancies and desires are also many, *z*. The above passage states that no less a number than *xyz* experiments would be performed successfully if attempted, man obtaining his desire in each case. Now, if only ten such experiments had been performed, without a single failure, we should be justified in assuming the probability of the successful performance of the innumerable *xyz*. But when has one such experiment ever been performed? The breeder seldom if ever draws up his plan beforehand and works towards its realisation. No one of experience would attempt to make even such a simple contrivance as a horned dog. The cranial peculiarities of domestic animals, which were brought to the public notice as products of the breeders' constructive skill, were not known to the breeders, even *after* they had 'constructed' them, much less before.

It is not easy to find the passage in Darwin's writings, wherein he made the claim attributed to him in the last quotation. On the contrary, let us see what he thought, in 1878, of the project of raising a fungus-proof potato by artificial selection. "Altogether the trial would be one requiring much care and extreme patience, as I know from experience with analogous work, and it may be feared that it would be difficult to find any one who would pursue the experiment with sufficient energy."[4] The doubt whether any one could be found to perform the experiment, is akin to the doubt that it could be performed.

Both teleologist and selectionist see behind the manifestations of life a constructive principle working for an end. Teleology is therefore mechanistic in origin and mechanistic philosophy is teleological. There is no essential difference between them, as others have pointed out. Mechanistic philosophy is usually preferred because it is supposed to be a stimulus. The active mind, however, needs no stimulus. Moreover, it likes to move in its own chosen direction.

Regarding the outlook of teleologist and selectionist as fundamentally the same, there is a great difference between it and another, which may be called vitalistic. From this point of view it is inconceivable that we should know the cause of life and evolution. It is impossible to construct a final or complete cause which is intelligible; since, in order to be intelligible, any explanation must be constructed out of some idea, the image of some common experience in the daily life of man as he now is. But if our perception of evolution is clear enough, we understand that humanity is in progress. How then can we construct anything complete or final out of that which is in progress, is incomplete, and can have no moment of completion?

Perhaps the majority of selectionists would say that they do not claim finality for their favourite theory. But that theory has been stretched out and applied just so far as to cover entirely the explanation of the teleologist, to be a complete substitute for it. A narrow-minded selectionist would claim the same degree of finality for his favourite theory, as would an equally narrow-minded teleologist for his. The finality of the selection theory

is displayed in the fact that it was put forward as a substitute for the other view, the first principle of which was its finality.

The vitalist is more impressed by man's ignorance than are the others. It is scarcely too much to say that he gets from his ignorance of final cause that very satisfaction which the others get from their knowledge of it.

Paradoxical though it may appear, the growth of our knowledge does not seem to lessen our ignorance in such directions, but rather to increase it. To say this is not to decry the pursuit of knowledge, which is very satisfying in itself, besides being praiseworthy and profitable at the present day. Common sense may tell us that to gain knowledge is to diminish ignorance. But that the growth of knowledge increases ignorance becomes obvious, when we compare a man's outlook with a child's. A man has more knowledge than a child and a greater sense of ignorance. For some, at all events, it is true that increase of knowledge widens their perception of the unknown, or makes them more aware of their ignorance. Few will deny that Darwin had more experience of nature than the average man, yet his whole writing shows that he felt his ignorance of the subject more than the average man. The relation between patient and physician affords an illustration of this principle. The patient, knowing little or nothing of disease, has usually an exaggerated notion of the physician's knowledge. The physician at the commencement of his career has often more confidence in his knowledge than after years of experience.

Each new and important discovery does not make one less to be discovered, but makes several more. The field of inquiry widens progressively as knowledge grows.

To explore this widening field we must strike out in various directions. To follow one path through it, a path which leads to the 'mystery of mysteries,' may be the choice of some explorers; but it cannot be the choice of those who see no mystery in the question—'Why or how did purpose, an attribute special to man, come to the whole of life?' because it is plain to them that purpose is not an attribute special to man.

This book will be regarded by some as an attempt to make Darwinism appear unnecessary, but the word Darwinism has different meanings, among which one may choose. For my own part, I regard it as the theory of descent accompanied by elimination. Thus, man finds himself widely separated from the rest of the animal kingdom, through the extinction of numerous anthropoid forms. There seems to be no doubt of this and the other distinctive branches of the animal kingdom arrived at their present state in a similar manner. This was the method of origin, but to say that organisms survive because of their fitness in relation to environment and therefore they fit their environment, is to me a custom of language, unquestionable perhaps, but not the expression of important truth that it is to some.

One cannot deny the truth of that which is usually considered to be the essential part of Darwinism, the so-called struggle for existence. The different kinds of organisms are of varying permanence. Some replace

others. That some survive while others perish is an evident truth. It is also true of what we call ideas or intuitions, which may be regarded as expressions of the different kinds of minds. This law of survival has come into prominence through the teaching of Darwin, and as a fact, as a description of events which can be seen to happen, it cannot, I think, be questioned.

No objection can be raised against the efficacy of natural selection, but the very strongest objection may be raised against the infinite extension of that principle. When we think about the efficacy of selection, we call to mind certain occurrences or experiments and thereby become convinced that selection is an efficacious principle. For example, it is well known that when a population has been under a hostile influence for a time it may become changed. It becomes as a whole less susceptible to that hostile influence. The change has no doubt occurred through the elimination of the more susceptible individuals. It was proved by the Plague Commission in India that the rats of a district in which plague had long been endemic were much less susceptible to the disease than those from a district where plague was unknown. Other better-known experiments have shown as well that a race may change as a whole, even in form perhaps, under a hostile influence, for its own benefit.

Let us by all means speak of such experiments as proofs of the efficacy of selection. But now let us consider the advisability of extending the principle of selection until it becomes a complete explanation of the manifold qualities of organisms and of the becoming of new qualities; that is to say, a complete explanation of

life and evolution. An infinite extension of the principle of selection, such as is often advocated, cannot, of course, depend on experience. What then does it depend on? The answer is obvious. It depends on a certain mental requirement, the well-known need for final explanation. I believe, however, that the need for such explanation, though real in some minds, is traditional or even absent from many others. Its absence, however, is not a part of a general lack of energy or enthusiasm; it implies a want of enthusiasm, merely in one particular direction.

The reader may ask—why, if the selection theory is a source of satisfaction to some, I should wish to oppose it. It is therefore necessary to point out that I am speaking against it only as science. A short experience as a teacher is enough to show that science must be for all. But the selection theory cannot be properly appreciated by all; only by those who need a final explanation of life. On the first occasion of my introducing the subject to Indian students, I was approached with the request, 'In regard to natural selection, please write a note on the board.' The students wanted the words of the formula and I could give them no more. If I said—'the fittest survive, therefore surviving organisms fit their environment,' some of my listeners might regard it as an important saying, while others might not. With justice might the latter say—'But what has that to do with science? We have just come from a chemistry lecture where we were shown that water is composed of two gases. Your teaching seems to be of a different order. Where is this fitness you speak of?' Some can see it clearly enough. 'Naturally,' they say, 'one kind

replaces another because it is superior or fitter.' But others cannot grasp either the meaning or value of the word 'because' in such a connection, and hence the selection theory is not for all, and should not, I think, be taught as science.

If we are to spread Western science over the world, we must at least know the aim of that science. At present there seem to be two distinct aims. The one is towards explanation of life or cosmogony; the other is towards knowledge of the manifestations of life, with a view to control. Which of these is the higher aim? Many would say the former. But those who see in any cosmogony a proposition as to how disorder became order, and see also that the apparent necessity for cosmogony arises directly and merely from the fact that man himself is daily converting disorder into order, cannot regard such explanations as the aim of science. Let us set out the rival opinions.

1. Life is a problem calling for a particular solution, the true one. Science is to solve that problem.

2. Life cannot be understood in the sense that we understand a contrivance. Science is the description of experience, a source of benefit and an outlet for activity.

These two points of view are distinct. Both cannot be occupied by the same person at the same time. It not infrequently happens, however, that a person passes from the first to the second, but seldom is the passage made in the opposite direction.

At the present day, the first is perhaps the more popular, but it is important to know whether this

popularity is real or only apparent. Tradition teaches that the greatest mind of the last generation saw the origin of life as 'that mystery of mysteries' and set to work to solve the problem. It is not for any individual to say that the human mind must or must not wonder at its experience; but rather to search his own mind, to consider whether he himself wishes for an explanation of life or whether life is not its own explanation.

Perhaps Western science is not engaged in solving the problem of life, but we must inquire if it has such an aim, especially if it is to spread Eastward. Before even the birth of Buddha, the monistic philosophers of India saw life as its own explanation, and so lost their perplexity and found satisfaction. Shall we urge their descendants to attain a lost perplexity, in order to soothe it by some theory?

If, as many believe, science is to spread through mankind, we must sooner or later make up our minds as to its aim. Is it to be directed towards experience itself, or is it to aim at something that lies beyond experience? Are we to follow the principle set forth in the following words? "It is not upon demonstrative evidence that we rely when we champion the doctrine of selection as a scientific truth; we base our argument on quite other ground." [5] It is unusual perhaps to advocate the sacrifice of experience in the name of science, but the tendency to do so is not unusual. We have been told again and again that the aim of biology is to prove that the phenomena of life are due to natural causes, and this saying arises directly out of the assumption that life might be due to unnatural causes. But what is unnatural

causation? The belief in unnatural causation, as I understand it, is that the phenomena of life are due to an invisible man-like entity. Those who hold such a belief seldom lose it. Their point of view cannot be clearly imagined by those who are unlike them. It is evident from literature, however, that this belief has never been universal. It is even more evident that a large number of persons are devoid of it at the present day. Speaking as one of the latter, I ask—whence comes the impulse or enthusiasm which moves so many to prove that the phenomena of life are due to natural causes, unless from the doubt that life might be due to unnatural causes? The entire absence of belief in the unnatural causation of life is necessarily accompanied, I think, by absence of belief in its natural causation. It is still a prevailing custom among biologists to regard their science as a search after this natural causation, and not in the simple meaning of the word cause, implied in saying that a spark is the cause of an explosion. But is it more than a custom? Most of us have the traditional need for such explanation. But how many have an actual need for it?

Books such as this appear valueless to those who lay great stress upon facts. They might admonish perhaps as follows: 'You hold that adaptation, the chief attribute of life, is incomprehensible, but you do not support your opinion by a single fact. You merely express your own feeling in the matter.' This I admit, but point out that the more usual view of adaptation, as a phenomenon requiring explanation, is also a feeling. It cannot be

supported by fact. Both views are expressions of outlook. The selection theory and the denial of it depend on feeling. "Emotions are the masters, intellect is the servant," wrote Spencer, without suggesting that they could or should be otherwise.[6] Intellect leads us to select facts with which to support our feelings. We have different feeling or intuition or mental quality and we must express our own, in order to know the general state. We cannot change the minds of others, but we can inquire if others are like ourselves.

There is another outlook common among biologists, which may be expressed as follows:—'The time has not yet arrived for us to understand life, let us then work and collect more facts. In the meantime, let us forget our individual differences.' This is an excellent attitude, but still it contains the assumption that life is a thing to be understood in itself. It seems to cling to the argument that because almost everything we handle in daily life is a thing made and so is comprehensible as to its origin, therefore life is a thing made, which ought to be comprehensible in the same sense. It loses sight of the fact that the more you look into life, the less comprehensible does it appear; so that if we do not understand it now, we shall be less likely to do so in future. The teleologist and selectionist understand life even now, but it is probable that we shall move away from their points of view.

This book is to emphasise the opinion that all life is one, that man is a part of life, that life is its own explanation. This is a very old doctrine. The standing objection

to it is that it tends to limit human activity. If life is not a problem, we must sit still under it and we do not want to sit still. So runs the argument, popular in northern latitudes. But I believe, on the contrary, that there is no necessary connection between perplexity and activity or between serenity and inactivity. I would go further and say that those who concentrate their attention upon the cause of life may be very active inquirers themselves, but they tend to limit the field of general inquiry. There is only one inquiry for them, only one kind of experience is of any value.

This tendency towards limitation, however, is diminishing at the present day. Many a teacher who has actually felt life as 'caused,' or acquired the habit of regarding it as such, must have been discouraged as pupil after pupil became willing to relinquish his search for an explanation of life, but still remained anxious to inquire into its manifestations.

For every one who would write 'that ultimate problem of life, the solution of which is the aim of biological science,' there are at the present day two or more who would write 'that ultimate problem of life, which, *as eminent men have insisted,* is the aim of biology.' There is to my mind an important difference between the two assertions. The second expresses uncertainty. If any one doubts that both kinds of assertion are made—the second kind more frequently than the first—let him settle the question for himself by a perusal of modern biological literature.

We want to know more about this uncertainty as to whether life constitutes a problem. How many of us

see life as something requiring explanation and how many of us see it in all its differentiation as one thing, primal and final? We cannot appeal to eminent men to help us in making a decision, since both opinions have been held by eminent men for a thousand years and more. Nor can we appeal to argument. If a man says that there must be an intelligible explanation of adaptation, he can no more be refuted than one who demands an intelligible explanation of gravity.

We are content with the *how* of some phenomena. It is chiefly in regard to the phenomena of life that the custom still prevails, of asking the question *why?*—a question born of wonder and perplexity. The word *how* is said to have grown out of the word *why*. *Why*, as I understand it, means 'What is the agency?' *How* means 'What is the manner?' It seems that *why*, in this sense, must have been the original word and that it became gradually replaced by *how*. Also, that *why*, in its original sense, must become extinct before very long, while *how* will continue its career. Even at the present day, *why* is commonly used in the sense of *how*. There is, to my mind, a certain important difference between the two words. The question *why* demands a final answer, in the form of a constructive entity, with a name. But the question *how* has no final answer. The answer must grow, together with man's perceptive ability.

The growth of science, as I understand it, is quite different from the growth of man's perceptive ability, which is evolution. If ten million chosen men were to be killed off and a hundred million chosen books were

to be burnt to-morrow, there would be scarcely any science left, but man's perceptive ability would be much the same as before. Humanity would soon make for itself a new science, essentially like the old, for science is an expression of human perception. This last diversion is to indicate that man makes science, but not his perceptive ability.

This introduction should include a statement of the usage of various terms. Many words have much the same meaning as the word *adaptation*, such for example as *suitability*, *fitness*, *utility*, *excellence*, *harmony*, *purpose*, and *design*. We must consider what these various words stand for and inquire how they resemble, and differ, from one another in meaning. Let us first see how these words resemble one another. They are the names of properties which we attribute to various things, but we only apply them to things, living or lifeless, when the thing has lasted for a long time, or when we believe or hope that it will last for a long time. Those things, which have relatively the more adaptation, utility or excellence, are relatively the more permanent, actually or expectedly. In the word *permanence* or *durability* is a meaning which denotes that of all the other words, and it is difficult to find another single word which will do this satisfactorily.

The reader may think that this is an arbitrary statement. He may argue that the general word *excellence* might be used to denote the meanings of all the others, and that even the word *permanence* might be made subordinate to it. This is perhaps a matter of choice. My own

opinion, however, is quite clear, viz.: that the word *permanence* denotes an attribute which is sure and measureable and hence important; whereas *excellence, fitness, utility,* and the rest are less certain and important. In studying historical records we notice in the first place that the various races, institutions, and types of contrivances had each a certain duration. They lasted for so many years. The excellence of each institution must have been, in its time, a matter of dissension, but all eventually displayed the amount of their excellence by the length of their duration. The prevalent custom of explaining durability or survival as the outcome of excellence, fitness, or utility appears quite unsound from this point of view.

If then we wish to find a meaning which is common to all these other words we shall find it, I think, in that denoted by the words *permanence* and *durability.*

We will now pass on to consider the special meanings and usages of the various words. It is interesting to notice how they shift and change in their special meanings whereas considered each as a synonym of *permanence* they become settled.

The word *adaptation* is used principally by naturalists to indicate the correspondence between an organism and its environment. *Suitability* is a commoner equivalent of *adaptation.* When we say a man is suited to certain duties we mean much the same as when we say that an organism is adapted to its environment. These two words, *adaptation* and *suitability,* have the same meaning though generally used in different circumstances. Then again, both are comprised by the word *fitness;* which

having the widest application of all, will be examined more fully.

In its simplest form, *fitness* means a relation of co-extension between two things, *e.g.* a box and a lid. Next, it means a relation of correspondence, also between two things, *e.g.* the complex called fish and the complex called 'watery environment.' The explanation of the fitness in the first case is commonly regarded as obvious. Man caused it, though whether he made the lid to fit the box, or the box to fit the lid, is not considered important. The second case, however, is usually held to require explanation. Although the thing to be explained is also fitness, now in the sense of correspondence, it is our arbitrary custom to explain how the fish became suited to the water, although to some minds it might seem as wise to explain how the water became suited to the fish. As used in biological speculation, the word *fitness* means a relation between two things, an organism and its environment. But the word also means a relation between *three or more parts* which were brought together to form a whole or climax. *We thus see that fitness, whether as a relation between two or many things, is in anything which is the outcome of man's activity or of a man-like activity, working towards an end.* This is, I think, the most firmly established meaning of the word.

As estimated at the present day, however, *fitness*, a relation between two things, is often in itself one thing, occurring in varying quantity. In this sense, as a thing of degree, it is synonymous with excellence. This alternative meaning of the word *fitness* accounts for much

of its value, as an explanation of survival. One who has difficulty in seeing that survival depends on fitness—as a relation, may have no difficulty in understanding that survival depends on fitness—as excellence. It is perhaps only within the last fifty years or so that the word *fitness* has grown towards synonymity with the word *excellence.*

Utility is a word of variable meaning, akin to fitness. It may mean a relation between a tool and its sphere of action and hence as an attribute occurring in many degrees; it comes, like fitness, to have the same meaning as excellence. It is also a word for an outcome of man's activity or of man-like activity. The meaning of utility is also regarded as approaching closely to the meaning of truth. Pragmatism teaches that the opinion which is the more useful is the more true. Here, again, we see the affinity between utility and fitness and their close relation to the word permanence. Its fitness is said to explain the survival of an organism. Its utility is said to explain the survival of an opinion. The same difficulty may be felt in both cases; how are we to know infallibly which organism is fitter or which opinion the more useful? These questions are only settled in time. Truth always prevails, since it is that which happens to prevail. It seems that the fundamental meaning of utility is *permanence.*

Excellence is a term of wide application; its relation to fitness has been mentioned. At the root of it, is the idea of *permanence* or *expected permanence.*

Harmony has from its origin the same meaning as fitness, a relation between two things, the outcome of a

certain similarity between them. (Though quite beside the present question, we may remark that harmony is sometimes used to denote absence of strife among organisms and sometimes to denote similarity of quality between organisms, for it is often assumed that dissimilarity means strife. But this is not, I think, in accordance with experience. Strife, the result of aggressive instinct, appears somewhat independent of similarity or dissimilarity.)

Purpose and *design* may be treated together. They are often used as equivalent to adaptation, especially to emphasise the similarity between the adaptation of organisms to their environment and the adaptation of a tool to its sphere of use. We have mentioned that an important application of fitness and its equivalents is to something which comes from man's activity or from man-like activity. This particular meaning is employed when purpose is used as equivalent to adaptation. Some seem to think that to speak of the purpose or design in life is to imagine an invisible entity, outside living matter, which works upon it designedly like a man, compelling it to behave as it does. But this is not necessarily so. One may speak of purpose in living matter in order to express the obvious fact that all living matter is fundamentally one and the same, that the activity of man which we call purposive, having in view his benefit and safety, is not peculiar in kind to man, and hence should not receive a special name of its own. Precisely the same kind of activity is evident throughout the whole range of life. If therefore we speak of purpose in human activity, we ought also to speak of purpose in all vital activity.

On more than one occasion when I meant to express opinion, critics have said that my opinions were indicated rather than expressed. Lest the reader may also think this, I will summarise my opinion concerning adaptation in a number of questions and answers, so that it may be clear to anyone, who may ask himself how far he is in agreement with me, if at all.

What is adaptation?—The primary attribute of living things; perceptible by all men, and therefore a reality. It is its own explanation, since an unadapted thing could not live.

What is the problem of adaptation? A question arising in the minds of some persons, but not of all.

How does the problem arise? *Owing to a particular resemblance between organisms and mechanisms.* This resemblance lies in the fact that both the organism and the mechanism show a particular attribute in their relation to circumstances; the attribute is termed adaptation or fitness. This resemblance causes wonder because man, the chief maker of mechanism, does not regard himself actually as life but holds himself apart from it. By so doing he makes for himself a problem. He asks himself the question—'How is it that life can produce the same kind of results that I myself can produce?' (The chief subject of this book is contained in the foregoing passage. The reader will not be able to overlook it. I can only hope that he will not be wearied by its constant repetition.)

Can this resemblance be explained?—Yes, obviously. Man is himself a part of life and his works also are an expression of the universal adaptability of life. A

contrivance is related to man, just as a bird's nest is related to the bird. A contrivance may be more complex but has no more or less of purpose than the nest. If there is design in a machine, there is also design in a nest; if there is no design in a nest, there is no design in a machine. But this will be obvious only to those who perceive the unity of life. It will not be obvious to those who see an essential difference between that which is natural and that which is artificial.

Does this view afford an explanation of adaptation? —No.

Of what use then is your view?—It is an expression of what some feel, that adaptation does not form a problem. The contrary feeling, that it is a problem, is liable to disappear as soon as one perceives how it came to be a problem.

The proposal that adaptation does not call for an explanation may also be set out in the following manner, in order that the reader, who presumably does not agree to the proposal, may be able to detect the exact position of the flaw, or flaws, in it.

1. Adaptation is a word to describe a certain state or condition.

2. This state may be seen in

Case a. The form of organisms.

Case b. The activity of organisms.

Case c. The lifeless products of the activity of organisms, *i.e.* contrivances.

If this state is to be seen at all, it is seen alike in each of these three cases. The basal similarity is well

illustrated by the fact that adaptation is sometimes easy and sometimes difficult to see in each of the three cases. For example—

In a. It is easy to see that the form of a fish is suited to mobile existence in a watery environment, but it is difficult to see that each of the thousands of different forms of the scales of fishes is suited to anything, they do not seem to be essential to life. The question as to whether they are essential or not, does not come into the illustration, which is merely to show that it is sometimes easy to see adaptation and sometimes difficult.

In b. It is easy to see that the activity displayed by an animal when it moves away from approaching fire is essential to life, but it is difficult to see that the gambolling of a lamb or any of those numerous actions in man and beast which may be comprised in the word 'play' are essential.

In c. It is easy to see that a contrivance such as a spade or plough is essential to the life which produced it, but it is difficult to see that a musical instrument is essential.

The reader may ask what these illustrations are for.

3. They are meant to illustrate that if we are looking at a state, worthy of a name, in *case a*, we are looking at the same state in *case b* and also in *case c*.

4. But if we are looking at the same state in each of the three cases, it is unreasonable to regard the state in *case c* as explained and to attempt to explain the states in *cases a* and *b* in terms of our explanation of *c*.

5. It is just as reasonable to consider contrivances as expressions of life as it is to consider activity or organic

form as expressions of life. Now, if this be granted, it is obviously unreasonable to make the whole, Life in all its aspects, subordinate to contrivance, which is merely one aspect or expression of it; but this is what we do, whenever we regard Life as a thing made, requiring explanation on that ground.

CHAPTER I

THE VARIOUS ASPECTS OF ADAPTATION

THE idea of adaptation is intimately connected with the idea of contrivance. If we are in the habit of discussing organic adaptation, it quickly becomes to us a reality in itself, but it cannot be introduced as such to a fresh mind. The saying 'organisms fit their places in the world' has no meaning in itself, but it can be made intelligible by adding 'like a key fits a lock.' Some such simile is necessary to complete the idea, and it must be provided by some man-made contrivance. The thought of organic adaptation depends for its very existence on the fact that man is constantly making things for a purpose.

The idea of adaptation is quite unlike the idea of growth, to take another familiar quality of living matter. The word *grow* must first have been used to indicate increasing living matter and applied subsequently to increasing lifeless structure. But the history of the word *fit* must have been the reverse of this. It must first have been applied to the lifeless, to indicate a property of contrivance and subsequently to living things. When we say that the town grows, we mean that it is like an organism in a certain respect, but when we say that an organism fits its place in the world we mean that it is like some contrivance in a certain respect.

We cannot separate the thought of organic fitness from the thought of mechanic fitness. The former cannot stand alone. It depends entirely on the latter.

Let us now consider what is perhaps the chief effect of adaptation on the mind, namely, the feeling of wonder. There is perhaps no more wonderful thing in the world than an insect which looks like a leaf. This wonder is most acute when such an insect is seen for the first time. It becomes gradually less, when we see similar cases among many other terrestrial and marine animals, when we learn from experience that owing to their colour, most animals are inconspicuous and some almost invisible among their natural surroundings, so long as they do not move. The perception of adaptation and the feeling of wonder it arouses are very intimately connected. The person who does not wonder at adaptation has scarcely perceived it. The wonder aroused by adaptation is liable to diminish progressively as more and more examples of it are noticed. When it is seen as a common thing, it is no longer a source of wonder, unless we counteract the tendency to neglect it, by constantly repeating and teaching that it is a wonderful thing; but not every one is able to do this. It is possible that if adaptation were to be more familiar generally; if it were to be seen as a thing belonging to every moment of life, as the primary state of life, as life itself; it would no longer inspire wonder. Whether it would exist in the absence of wonder might be doubtful, but if it ever ceased to exist, it would no longer be necessary to explain it.

But we cannot abolish adaptation in this manner. Unfamiliarity is in any case a source of surprise or superficial wonder and familiarity is a dispeller of it, but adaptation is, we all know, a special source of deep wonder. We cannot say that Darwin was unfamiliar with adaptation, yet we know that he, like Socrates and many other great thinkers, wondered at it profoundly. We must inquire then why adaptation is a source of special wonder.

The wonder lies in the fact that there is a certain striking resemblance between man-made contrivances on the one hand and organisms on the other. This resemblance is perceptible, since both are adapted to circumstances, the one to the sphere in which it is used, the other to the sphere in which it lives. *Search how we may, we can find in adaptation no other source of wonder than in this resemblance.*

Now, it must be emphasised that this resemblance is not wonderful to every mind. It is possible to argue in the following manner. Man is a living thing, a part of life. All the activity, as well as the form of every living thing, is adaptive. Hence, the many lifeless contrivances of man—and we must not forget the lifeless contrivances of animals, such as nests—being products of life, must be adaptive. Therefore, it is not more wonderful that organisms should be adapted than that mechanisms should be adapted. The common opinion that the adaptation of mechanisms has its explanation in man, while adaptation of organisms lacks an explanation and calls for one, appears to be unsound when examined by any one who fully perceives that man is a part of life and not outside it.

The feeling that the adaptation of organisms and the adaptation of mechanism are both wonderful states is not possible and does not arise, I believe, in any mind. *The wonder does not lie in either of the states themselves but in the resemblance between the two;* not in the fact that mechanisms are adapted (who would wonder at that? Man, in daily speech, the cause, is so obvious) but in the fact that organisms resemble mechanisms in being adapted.

We will now leave the more general ways of regarding adaptation and pass on to consider the subject in some of its more special or technical aspects.

One of the greatest difficulties in explaining adaptation arises from the fact that the term means so much. Moreover, it has no limits. The term may be extended to every aspect or every moment of life without objection. But the employment of the one term shows that what it embraces is a single attribute of organisms or a single idea of the mind. Adaptation, as technically estimated, contains, however, two aspects. There is the state of being adapted and the process of becoming adapted. Both are universal in organisms. Every living thing is adapted to its surroundings in large measure, both in form and activity. Every living thing is also liable to change so as to become further adapted in small measure. Strictly speaking, the word adaptability means the ability to become adapted, but it will be used here to indicate the process of becoming adapted.

Though we do not understand adaptability or the process of becoming adapted, we may say, for the sake of discussion, that through adaptability more adaptation

is added to the organism. For example, if one injects small and increasing doses of snake venom into an animal, that animal becomes different from its fellows at least for a time. If bitten by a snake it will not die. It is therefore better adapted or has more adaptation so to speak than its fellows. The vexed question as to whether this added adaptation can become permanent in the race by transmission from parent to offspring need not detain us. We know, at least, that it is not obviously transmitted.

Let us now regard adaptation as a state or attribute of organisms and, for the sake of discussion, let us materialise it. We may then analyse it with the help of the well-known belief that acquirements are not inherited. We may say that any mature organism has at any moment a certain amount of adaptation, which is in two parts. The one part, by far the larger, is transmitted from parent to offspring; while the remainder, trivial in amount, cannot be so transmitted.

Thus we arrive at the distinction which many writers have drawn. There is individual adaptation, which is not transmissible and there is racial adaptation which is transmissible.

Individual adaptation comes to the individual because of its adaptability. Custom allows us to say so perhaps, though the saying is merely a circuitous statement of the fact that organisms become suitably changed in various directions, according to circumstances.

Having drawn this customary distinction between individual and racial adaptation, let us inquire further. Are they distinct phenomena? If so, why do we apply the one word adaptation to both? They appear as one,

since there is in both the same reminiscence of man-like activity, the suggestion of what is called purpose.

When we perceive that animals in the arctic regions are born with thicker fur than those in the tropics (racial adaptation), and when we perceive an increase in the thickness of an animal's coat at the approach of winter and a decrease in the same by a falling out of hair at the approach of summer (individual adaptation; the phenomenon can be well seen in the horse), we are equally surprised, but only because we ourselves put on warmer clothes when necessary. We need not necessarily wonder at both individual and racial adaptation, taken together, but it seems absurd to wonder at one and not at the other. Hence they are really one and are adequately included in the single word adaptation.

Though it seems logical to regard individual and racial adaptation as one phenomenon, yet they are treated by some as though they were distinct. The distinction arises in the following manner. An observer, who has spent much of his time examining various cases of individual adaptation finds himself quite unable to account for them on the grounds of selection. Not only is he unable, he is also unwilling perhaps. He cannot see the necessity for doing so. Each case that he observes has its own obvious cause. A general or ultimate cause embracing every case seems to him unnecessary. Ultimate cause is incomprehensible. He cannot abolish the incomprehensible either by regarding it as a selective process or by calling it a guiding or purposive principle. He feels that he must either acknowledge the incomprehensible or affirm that the mind of man is already complete and thus abandon his belief in evolution.

This may not perhaps be a good description of how the conviction arises; but at all events, many of those who are specially acquainted with individual adaptation are convinced that it cannot be due to a selective process, occurring now or at any time in the past. This conviction has led to the custom of regarding racial and individual adaptation as distinct parts of one phenomenon, a custom which must remain so long as we continue to require an explanation of racial adaptation and find it in selection.

There is on the one hand individual adaptation; few believe that it is the result of selection. On the other hand, there is racial adaptation; the many believe that it is the result of selection.

If this distinction is to be drawn, it must be deep, for if these two parts of adaptation differ at all, they differ in origin. Let us again ask why, in spite of the distinction between them, both parts receive the same name of adaptation? The reason is obvious. Both are suggestive of human activity. Man is amazed that organisms should exhibit, in their form and activity, the same kind of appearance—if we may call adaptation an appearance—as is evident in the results of his own activity. He cannot believe that he himself is a part of life.

The difficulty of explaining individual adaptation by the selection theory is most evident when we see that animals and plants are able to adapt themselves, at once, to conditions which are occurring for the first time.

This difficulty has often been expressed; for example, in the following passage—'The only cases in which self-adaptation may be demonstrated as produced by natural

selection are where organisms are restored to an environment which some of their ancestors experienced." [7] That is to say, selection cannot have produced the ability of an organism to adapt itself to a circumstance that has never occurred before. Let us give two examples of such adaptation, one from the vegetable and one from the animal kingdom.

The following well-known experiment provides us with such an example. A number of like seedling plants are taken. The stems of some of them are subjected to an increasing tension applied by means of a cord passing over a pulley and bearing an increasing weight. When the weight applied is sufficient the stems will break. The average breaking weight is recorded and a number of like seedlings are subjected to a tension somewhat less than it, for a day or two. It is then found that the latter are able to withstand a much greater tension than other seedlings of the same age which were not so treated. That is to say, the plants were able to adapt themselves to an adverse condition which was occurring for the first time. Seedlings were never before subjected to tension in nature.

Let us take another example from the animal world. The modern treatment of disease is largely an attempt to control individual adaptation. The earliest experiments made in this direction were as follows. The vegetable poisons ricin and abrin were injected into animals in small and increasing amounts, until the animals could withstand far more than the usual fatal dose. It was then found that the blood of these animals was different from that of like animals which had not been so treated; since it was capable of neutralising the

particular poison used, just as an alkali neutralises an acid. The animals therefore adapted themselves to conditions which were occurring for the first time.

These are two out of innumerable examples which might be given to illustrate the well-known power of becoming adapted to be seen in every organism. Every living thing has this power, if not it could not live. It would perish under the first adverse influence that came against it.

The immense antiquity of individual adaptation is perhaps the greatest difficulty presented to those who would explain it. Its antiquity becomes evident when we consider that the earliest organisms known to us from fossils are essentially like those living to-day. Just as it would be possible to demonstrate the adaptability of Algæ to-day, so would it have been possible to have demonstrated it among such organisms in the palæozoic epoch, if man had been in existence at the time.

An experiment could no doubt be devised to-day to demonstrate the adaptability of Lingula. Who, knowing the abilities of living matter, will affirm that Lingula is composed of unadaptable substance? But that same experiment would have given the same result in palæozoic times as to-day, if it had been tried. Who can believe, after comparing the shell of a living Lingula, an animal which is still common in some parts of the world, with the shell of a Lingula found in the most ancient fossiliferous rocks, that shells so similar could contain at one time unadaptable protoplasm, at another time adaptable protoplasm? Living matter must have been fully adaptable long before the record of fossils commenced.

If it was fully established so long ago, how can we assure ourselves with any confidence that we know the process by which it came into being? The only process which has been suggested, is selection. Now, selection involves elimination and elimination requires a hostile influence and there must be some correspondence between the hostile influence and the quality of the thing left over or selected by it. If we are to believe that the adaptability of protoplasm was produced by selection, we should at least be able to imagine the nature of the hostile influence, since it would be related to that which it selects. But what could it have been, to have eliminated certain organisms and passed over or selected others, so that the descendants of these latter were able, many millions of years later, to adapt themselves to many and various conditions, occurring for the first time?

The firmest adherents of the selection theory, however, believe that individual adaptation is somehow due to selection. They feel perhaps that to admit the contrary would weaken the grounds of belief that racial adaptation itself is due to selection, and indeed such a feeling is inevitable. It is illogical to explain one part of a thing but not the other part.

There is, on the one hand, individual adaptation, a thing of the utmost interest to the physiologist and pathologist, a thing requiring investigation, that can be seen to arrive, so to speak, and may be controlled, but not in itself a source of wonder calling for explanation. On the other hand, there is racial adaptation, a thing full of interest to the systematic zoologist or botanist, a thing existing in every specimen collected, compelling wonder

and demanding explanation and finding it in natural selection. This double attitude towards the same thing may appear somewhat illogical to workers in one or other field of inquiry, but it is far more so to those who have worked in both fields.

Hence, some writers insist that individual adaptation is somehow due to selection. The following is an example: "Whenever organisms react adaptively under external forces they do so because of special powers conferred on them by natural selection." [8] This quotation was chosen because it is accompanied by the following interesting passage, which shows how the opinion is arrived at. "The other supposition, that organisms are so constituted that they must react under external stimuli by the production of new, useful characters, or the useful modification of old ones, seems to me to be essentially the same as the old 'innate tendency towards perfection' as the motive cause of evolution, a conception which is not much more satisfactory than special creation itself."

This passage is a strong expression of the feeling that life must be the result of a constructive principle of some kind. I do not wish to decry this feeling or to deny that it is common, but to emphasise the fact that it is not in every mind. That it must always remain with us, is by no means certain. One who believes that individual adaptation is due to selection, must be moved by some such feeling. With Weismann he believes "simply because we must." The compulsion, however, lies in the thought that if we do not believe in selection, we must believe in an invisible man-like entity. As a reason for believing in the selection theory, it is purely personal and cannot be imparted to all.

There are many ways of regarding adaptation, but the sharpest contrast of opinion is brought out when we ask the question—is it possible for living matter to be unadapted? If we compare the largest aquatic organism, the whale, with one of the smallest, such as the vorticella, we see certain mechanisms which are absolutely necessary to the life of the organism. We may say that the whale is larger and more complex than the protozoon, but we cannot say that the one is better adapted than the other. Nor can we assert, with this in mind, that the vorticella is better adapted than any smaller or simpler organism that could be named or thought of. Where then is the organism that is unadapted to its surroundings? The reader will no doubt agree that there is no such thing at the present day. If then every living thing is adapted, how is it possible, or why is it necessary, to imagine an unadapted thing as living in the past? What actual experience have we that would lead us to believe in the past or present existence of unadapted life? Yet it seems that this conception of unadapted life is not only possible, but is the customary starting-point for the current explanation of adaptation. The problem as understood by some is to explain how unadapted substance became adapted. This is not often expressed, it is more often implied. It appears in the preface of Mr. T. H. Morgan's well-known book where in regard to adaptation he asks—"Is it due to something inherent in the living matter itself, or is it something that has been, as it were, superimposed upon it?"[9] Mr. Morgan did not maintain that these were necessary questions, but indicated very truly that they were usually asked.

The view of adaptation as something superimposed

is expressed in the following passage—"Adaptation is part of the present order of nature, just as is the distribution of land and water, and we have reason to believe that neither in its present form has existed from all eternity." [10] The analogy between adaptation and the distribution of land and water does not seem very close. It is, however, implied in the above passage that adapted life came somehow out of unadapted substance, and we are said to have reason for this belief. We have reason for believing that adaptation was the same when the record of life commenced as it is to-day. But what reason have we for forming a conclusion about life prior to that period? We have no actual reason for believing that life has not always existed. Some, however, have the feeling that it has not always existed, and this feeling arises because most things which they daily handle were made and therefore had a beginning. We have no actual knowledge of such matters whatever. Our feelings about them find expression in the analogies of daily life.

From the opposite point of view, adaptation is inherent in living matter. This opinion cannot of course be supported by evidence, but neither can the other, that adaptation is something superimposed upon living matter, be supported by evidence. The latter view is derived from the thought that a mechanism, made by man for a purpose, is originally a mass of disordered unadapted material, upon which order and adaptation are superimposed by the hand of man, by comprehensible methods. Hence it is argued, the order and adaptation of organisms came out of disorder and are therefore to be understood. But this feeling is not in every mind.

The opinion advocated here, that adaptation is

inherent in life, which cannot be known to have had a beginning, is not perhaps in accordance with the first principles of modern science.

Spencer stated his case clearly in the following passage: "Self-existence necessarily means existence without a beginning; and to form a conception of self-existence is to form a conception of existence without a beginning. Now by no mental effort can we do this." [11] It is difficult to understand why Spencer thought this, for surely it is obvious from literature that many men have made, to their own satisfaction, this very effort which he thought impossible.

There are two possible views as to the origin of all things—

(1) That something came out of nothing.

(2) That something has existed for ever.

From a strictly scientific point of view there is not a pin to choose between them and it is merely an arbitrary custom to favour the first.

The idea of an Uncreated is at the root of most religious systems and its identification with Life, including Man, is a well-known tenet of some of them. Such doctrine comes down to us from long before the Christian era, nor has it lost strength in its descent.

The other belief that life had a beginning and arose somehow out of the lifeless, which itself arose out of nothing, may be the first principle of modern science, but it is not the first or last principle of human thought. It is due to an infinite extension of a certain analogy. Every man-made contrivance had a beginning, therefore everything had a beginning, and by no mental effort can we think otherwise. So runs the argument. But so

far is this from being universally true, that a man might say with equal sincerity—'By no mental effort can I make the infinite extension of that analogy.'

There is an opinion that all we mean by the word adaptation could as well be comprised in the word egoism. This opinion is expressed in the following passage—"... each species, each individual even, retains only a certain impetus from the universal vital impulsion and tends to use this energy in its own interest. In this consists *adaptation*." [12] To those who see adaptation as fitness, in the sense that a glove has a fitness in relation to the hand, such an opinion will seem unusual. But this is all that can be said against it. The impulse to attain survival, whether in individuals or races, is commonly called egoism. If now we consider the fact of survival as primary and explicable, and try to explain why some organism survived in a particular case, we may say that it survived through its greater impulse to attain survival, *i.e.* through its egoism, or we may say that it survived through its superior fitness. In both cases we say that it survived because of an entity which it possessed in greater measure than its fellows. Can we see a clear distinction between these two entities, clear enough for us to deny that they are the same, clear enough for us to assert that fitness is not egoism.

The appearance of fitness as egoism is presented in certain sociological teaching. Among humanity there is a middle-class and a lower class. Some teach that the members of these classes are different in kind. They perceive, so they say, that the former have more fitness than the latter, but less ability to perpetuate and survive.

In their estimation, therefore, fitness and the ability to survive are not the same thing.

The following passage comes to mind, in this connection—"That is your entire will, ye wisest ones, as a Will to Power; and even when ye speak of good and evil, *and estimates of value.*" [13]

We will end this chapter by mentioning an opinion with special emphasis, viz.: that the terms 'adapted' or 'fit' should be used relatively as usual, but only to indicate that which must necessarily survive. From this point of view, fitness is not the thing which decided the struggle, since it can be perceived only after the struggle has been decided—assuming for the moment that it is a perceptible reality. One who holds this opinion can have no fear that the fitter portion of mankind, wherever it is, might be swamped by the less fit. Hence, there is a certain practical advantage in this view, since the thought that the fitter portion of mankind might possibly be swamped by the less fit, must be a source of anxiety to those who think it, and it is well to be rid of our anxieties.

This view of fitness has appeared slowly. We need not trouble to inquire who was the first one to express it. It was perhaps introduced by means of the terms 'selection value' or 'survival value' coined by Romanes.[14]

To turn the phrase 'survival of the fittest' into the phrase 'survival of that which has the greatest selection value,' is to take a wide step which cannot be retraced. After it has been taken, others follow as a matter of course, such as 'the survival of that which must survive,' or 'the survival of the survivors,' phrases with less and less of that explanatory value which many have found in Spencer's original phrase.

CHAPTER II

VARIOUS VIEWS OF LIFE

LET us consider briefly some of the explanations of life —using the word life in a broad sense, to include adaptation and evolution. It is obvious that nothing could live for a moment if it were not adapted to circumstances. Hence, life and adaptation may be considered together. Moreover, living things undergo change continually; life and evolution may therefore be treated in the same manner.

There are various ways of looking at life. The many religious and philosophical systems, propounded in well-known phrases, express this variety only partially. The variety of outlook is no doubt much greater than the variety of the systems. Generally speaking, a system expresses any one's actual thought approximately but not exactly. This is inevitable, since the ability to express one's own thought adequately is unusual, and therefore, as a rule, the many express themselves by phrases which are invented by the few. In some cases one's own thought corresponds almost exactly with a borrowed phrase, much to one's satisfaction; but in other cases there is no such correspondence and the phrase is used, if at all, merely from custom.

We cannot hope to know much about the variety of actual outlook, for it is scarcely possible to get beyond

the phrases or formulæ; but there appears to be a certain perception common to almost all.

This perception is expressed in so many different ways that its unity is liable to be overlooked. There is, however, a certain underlying resemblance between the various modes of expression. Let us illustrate this by comparing two very different outlooks, in order to ascertain what they have in common.

First we will consider the outlook of a modern thinker, who appreciates evolution. He holds that, for each individual, the world corresponds to the extent of the perceptive ability of the individual. He also holds that mankind's perceptive ability will increase as time goes on, and that this increment, which is human evolution, will not cease. He is, therefore, aware of that which is within the sphere of his perceptive ability, the known and the unknown; and he is also aware of something outside that sphere—the unknowable *to him as he is*. He is therefore aware of that which he personally can have no hope of understanding. He also sees that an imaginary being, with far more perceptive ability than himself, would be in a like position, since he too would be unfinished —unless, of course, evolution had a climax, which to him is inconceivable. Now, primitive man speaks and behaves as though he also was aware of that which is beyond his comprehension.

Hence, both are aware of that which is beyond them as individuals, of a supernature as it has been called—nature being, from the same point of view, all that is clearly perceptible.

Man has long exercised his imagination concerning supernature and endeavoured to understand it. His

endeavour has usually been in a certain direction, which is indicated by the conviction that nothing happens without a cause. This endeavour is the outcome of a certain mental requirement, which is common, but not, I think, universal. The fact that it is not universal, gives rise to much dissension. Mankind is united in being aware of supernature, but divided as to how it should be regarded. Some have a mental requirement which compels them to form definite ideas in relation to supernature, to attribute definite qualities to it, to see it as a working entity, as a cause of life. Whereas, others have not this requirement.

Almost all are willing to apply certain words to their conception of supernature. Of these the commonest are the words infinite and eternal, meaning unlimited in time and space. To use such words in this connection is to express the belief that there will always be something beyond that which man will be able to perceive. It matters not what we call this belief or feeling. The important fact is that it has had a place in the mind of man for some thousands of years. Let us take the following expressions of it as modern examples.

"A power of which the nature remains for ever inconceivable and to which no limits in Time or Space can be imagined, works in us certain effects" (H. Spencer [15]). We find the same expression in Huxley's words—"Will the progress of research . . . show us the bounds of the universe, and bid us say, Go to, now we comprehend the infinite?" [16]

There must be, I think, a difference of intuition, or as it may be expressed a difference of mental quality, between those who have for their philosophy a proposition

which they understand, and those who have a view which they do not understand. To the latter, the fact that any explanatory proposition is intelligible is a sure sign that that proposition is incomplete, because the human mind is incomplete. It is not now as it will be in the far future. Every theory of life, which is intelligible, must be founded on some analogy taken from the daily life of a man as he now is. An explanation cannot therefore be both intelligible and final.

The dissension between those who have definite and indefinite objects of belief is very old. Spinoza described certain definite beliefs as attempts to make the gods as foolish as men. His words express, what cannot be denied, that all definite beliefs are attempts to endow the unknowable with certain human proclivities, so that it appears as a controlling constructive or powerful entity.

It is necessary to pause for a moment and point out that the words definite and indefinite are often used in a manner other than the above, viz.: for any proposition which is satisfying or unsatisfying to the speaker. For example, the selectionist would call teleology an indefinite belief, but it seems to me that it is not so, since the teleologist feels that he knows the cause of life. Doubt does not touch him. Neither has the true selectionist an indefinite belief; he also feels that he knows the cause of life.

It is also important to notice the distinction between uncertainty of mind and indefiniteness of an object believed in. The mind of the true teleologist or selectionist is certain and the object believed in is definite. It is, however, possible for the mind to be certain, regarding an object of belief which is quite indefinite. This is,

perhaps, a common state of mind. It is noticeable in the passages quoted above from Spencer and Huxley. They express both certainty and indefiniteness. The attitude of the mind is certain. The object of belief, for there is such an object, is indefinite.

There is, we have said, a broad distinction or gap between those who have definite and indefinite objects of belief. They differ in intuition. We express our intuitions, that is to say, the quality of our minds, in words and actions, but we are no more responsible for that quality than we are for the colour of our hair.

It is enough to mention with emphasis the fact that some are satisfied with their indefinite object of belief. There is nothing in their view to discuss. We may therefore leave it and consider the definite beliefs.

Of definite beliefs two are well known, teleology and the selection theory. There are some who will argue in favour of one or other, though not really obsessed by either; but there is no doubt that to many these beliefs, especially the former, are definite and satisfying.

The teleologist regards a mechanism and perceives that it is adapted to circumstances, that it is suited to the sphere of action in which it is used. He regards an organism and perceives that it also is adapted to circumstances. Man was, by our language, the cause of the mechanism; therefore something manlike must have been the cause of the organism. There is then outside the limit of the common senses some entity, which is the cause of life. This entity is comprehensible in so far as it is manlike in mode of action, though transcending man in ability to do more. This is the teleological

argument, as I understand it. The word suggests end or purpose, and the idea which it conveys is derived from the saying that human activity is purposive, with an end in view.

But it seems that in this particular form it was never a widespread belief, but was peculiar to contemplative nature-loving minds. It has a more popular equivalent, in which there is also a perception of a manlike entity; but where the teleologist sees an inventor or artificer, the popular mind sees a ruler or controller. This latter view, which has been, and is perhaps still, the most widespread philosophy, may be called for the moment dominative theism. It cannot, of course, be separated from teleological theism, but it is true that some minds are more impressed with the ingenuity in nature, while others are less so.

It is more usual for man to be interested in himself, in human intercourse. Hence, it follows that whereas the few have believed in a Being whose chief attribute is ingenuity, the many have believed in a Being whose chief attribute is quite otherwise, namely, domination. This was due to the fact that in the past, domination was the central factor in human intercourse. It is still an important factor, but it is less important than formerly. In the Middle Ages, when most people were under the control of some few dominating persons, lived in fear of them and felt that such a state was inevitable, a dominating entity was naturally the basis of religion. There is no reason why religion should have changed, if social conditions had not changed, if the average man had not lost his humility and come to see that dominating persons are not the centre of the social system. The change in

religion is caused by the changing social conditions, only in the sense that it is a companion of it or an expression of it.

It is indisputable that human relations have changed considerably. We no longer regard our leading men as such were regarded in the past. With the gradual passing of effectual domination from human intercourse, there is inevitably a passing of dominative theism.

But as this belief leaves us, another takes its place. Competition is now regarded as the most important factor in daily life, and so it tends to become the basis of our philosophy.

There is, I admit, a certain difference between the two views; since the spirit of domination can be conceived as an individual, the compeller himself, who may be harsh, just, or merciful, according as we are ourselves and as we would therefore wish him to be. The competitive process, on the other hand, cannot be conceived as a person, hence its anthropic origin is often overlooked.

But though the idea of domination lends itself to representation as an individual or personal entity, yet it does not arise from the idea of an individual but, like the idea of competition itself, out of a relation between individuals. A competitor without fellows is not a competitor, but neither is a king without subjects a king. *As soon as we perceive that dominative theism arose from a certain relation between men, we no longer see a great difference between it and the selection theory or competitive theism as that theory may rightly be termed.*

Each philosophy is suited to the social condition of its own epoch. The change from the one condition to the other has been gradual and is still in progress, but

there is no reason to believe that the competitive system under which we now live is permanent. In the past it was the custom to uphold domination, just as it is now the custom to uphold competition; but the latter system must give way sooner or later to some other. To many persons even now it is no more agreeable than that which it has replaced.

It may be argued that competition is a wider process than domination, that it occurs throughout the kingdom of life; and this is true, but it does not therefore appear as a cause or power producing change or progress. The strength of competition, the rate of elimination, or the amount of the force of natural selection, so to speak, varies immensely in every department of life. It is a hundred times greater here than there, or now than then; but we have no experience to lead us to the belief that evolution occurs only where and when this competitive stress is great. The arrival of some new thing is usually accompanied by the departure of an old, but we cannot regard the elimination of the old as the cause of the arrival of the new. Many writers have pointed out this obvious truth.

From the time of its first publication, the theory of natural selection has been regarded by some as akin to teleology. Kölliker and Flourens were among the first to criticise it from this point of view. Kölliker wrote—"Darwin is in the fullest sense of the word a teleologist. He says quite distinctly that every particular in the structure of an animal has been created for its benefit, and he regards the whole series of animal forms from this point of view."

In his 'Lectures and Lay Sermons,' Huxley quoted

this passage and commented on it in the following words: "It is singular how differently one and the same book will impress different minds. That which struck the present writer most forcibly on his first perusal of the 'Origin of Species' was the conviction that Teleology as commonly understood had received its death-blow at Mr. Darwin's hands."

Huxley evidently considered that there was an essential difference between teleology and the selection theory, but as mentioned before, the difference lies in the fact that competition cannot be conceived as a personal entity, whereas both domination and ingenuity are naturally so conceivable. The idea of competition is not anthropic in appearance but it is so in origin. It arises from a relation between men, *but so also does dominative theism.*

In reference to this subject Patrick Geddes has written—"The substitution of Darwin for Paley as the chief interpreter of the order of nature is currently regarded as a displacement of an anthropomorphic view for a purely scientific one; a little reflection, however, will show that what has actually happened has been merely the replacement of the anthropomorphism of the eighteenth century by that of the nineteenth. For the place vacated by Paley's theological and metaphysical explanation has simply been occupied by that suggested to Darwin and Wallace by Malthus in terms of the prevalent severity of industrial competition, and those phenomena of the struggle for existence which the light of contemporary economic theory has enabled us to discern, have thus come to be temporarily exalted into a complete explanation of organic progress." [17]

The opinion, stated in these words, may have been expressed by others, but in my somewhat limited reading, I have not met with another such clear statement of the case. Indeed, the chief purpose of this chapter is to emphasise the importance of this view, and perhaps to carry it a little further. Is it true that "a little reflection will show" the selection theory to be anthropomorphic. If so, why must we continue to teach it as science? Other opinions, however, are held as to the value of such philosophy. Take, for example, the following passage—"No better illustration of Darwin's wholesome anthropomorphism can be found than the cardinal idea of the struggle for existence. It is an idea borrowed from human life."[18] But is this truly representative of Western thought, to be offered to the East as such? How can we uphold one human relationship, as an explanation of life, in place of another?

We will leave teleology and consider very briefly another theory, that of Lamarck which was urged by Spencer, partially by Darwin and also by many others. This theory does not present us with a constructive principle; hence, it scarcely seems to be an explanation of adaptation. The teleologist points to an invisible artificer. The selectionist regards the breeder as a manufacturer of animals and sees in his supposed method a constructive principle of infinite possibility. But in Lamarck's theory there is no such appeal; it explains adaptation from adaptability. It is evident that every organism is to a small extent adaptable to its surroundings. Spencer and others believed with Lamarck that what was gained through adaptability could be inherited

and so added permanently to the adaptation of the race. Without discussing this vexed question, we may say that if Lamarck's theory is an explanation of adaptation it leaves adaptability unexplained. Those who see racial and individual adaptation as parts of one phenomenon, must think that if Lamarck explained anything he did so by means of the same thing. The fact that it does not contain an intelligible explanation of life, constitutes its chief defect, *or its chief merit*, according to the critic's point of view.

CHAPTER III

THE ORIGIN OF THE NEED FOR EXPLANATION

"THAT organisms which live, thereby prove themselves fit to live, in so far as they have been tried; while organisms which die, thereby prove themselves in some respects unfitted for living, are facts no less manifest than is the fact that this self-acting purification of a species must tend ever to insure adaptation between it and its environment." [19]

These words have often been repeated in substance. They express the conviction, felt by many, that the selection theory provides us with an explanation of adaptation. But what do they explain, why are they necessary?

They are necessary because many persons perceive purpose, as a human attribute, permeating the whole of life. They are unnecessary to those who see purpose as a vital attribute in the first place, as an attribute which must therefore be present in man. Some feel that the adaptation of organisms is due to an invisible manlike entity, which is outside life and influences it, and some feel that it might be so due. The latter are in doubt and the need for an alternative explanation such as the selection theory seems to arise from that doubt. Those who do not see purpose, as something suggesting human activity which occurs throughout the whole of life, require no explanation of it.

The selection theory, as an explanation, depends largely on the meaning of the word fitness. Spencer regarded the word fitness as expressing a certain necessity of thought, but it might also be regarded as a custom of language. The reader may think perhaps that there is little difference between a necessity of thought and a custom of language, that the first necessarily implies the second. But the two are not always coincident. For example, the idea of fitness may be estimated quite differently by two persons, though the word is the same for each.

The idea of fitness, as a thing of degree, must be very old and can only have arisen, I think, in one way, which may be illustrated as follows: Primitive man made something, let us say a flint arrow-head. Subsequently he made another, somewhat different from the first, which penetrated with equal force further into the quarry. He threw away the first, but kept the second for future use and for a pattern. He saw in the second a something which the first had in smaller measure. This something eventually came to be expressed by words such as fitness, utility and excellence. These meanings became so settled in language that the saying, 'I prefer this tool to that because it is more useful,' or 'This organism surplants that because it is fitter,' were regarded as necessary explanations of events. But it is quite possible to see A surplant B without thinking that the event occurred because A was fitter than B, without thinking that the superior fitness of A was the cause of the displacement. Hence, although to some fitness may appear as an entity associated with a thing and causing it to be permanent, to others it may appear devoid of any ability whatever. Fitness may indeed express a certain necessity of the

thought of some, but to others it is not more than a custom of language.

In the idea of fitness, some see the cause of evolution. A spark is said to be the cause of an explosion, but does the word fitness indicate any actual quality of organisms which is related to evolution in the same way that the spark is related to the explosion? Surely we are not making the same kind of statement when we say, 'this organism survived because of its fitness,' as when we say, 'this powder exploded because of the spark.' What then do we mean by the cause of evolution? How did the idea of cause in this particular sense arise? Simply because man has believed that life was caused by a man-like entity, a belief which arose because man speaks of himself as the cause or author of contrivance.

The verb to explain is commonly used in two distinct senses—

1. To provide man with cosmogony.

2. To know how some event occurred so that we may control it (for example the spark and explosion).

When the public says that science does not explain life, they use the word in the first sense. In reply, scientific men emphasise the second meaning of the word and retire from the discussion. Unfortunately they are loth to say, 'We do not claim to explain life in that sense. The idea of cosmos includes the idea of chaos, and a cosmogony is a statement of how the latter becomes the former. You require such a statement merely because you yourself are always converting disorder into order and cannot keep the fact out of your mind.' But few scientists are willing to say this. Like every other kind of worker, they hold their work to be of supreme

importance, and as long as cosmogony is widely held to be man's supreme desire, so long will they refuse to admit that it is no business of theirs.

I do not believe, however, that the majority of scientific workers at the present day have final explanation as their aim. This aim was once real, but it is now scarcely more than traditional. Perhaps it would be truer to say that this aim is less real than formerly, for we know that new explanatory theories, which are essentially teleological, are still put forward and find favour. The aim is still present in the mind of those, not a few, who argue that because mechanistic formulation is inadequate to explain life, therefore we must substitute some other. It is also present in the minds of those, again not a few, who, finding teleology repugnant, even in its latest form, assert that we must rely on some such explanation as the selection theory. I have admitted that there are not a few, and again not a few, who hold the opinion that life is a thing demanding explanation; yet it is evident from contemporary literature that some see it as a thing not needing explanation. It is the chief purpose of this book to ascertain, if possible, the direction of opinion on this particular point.

If we are to decide this question, we must keep in mind a certain source of error, which arises from our well-known love of controversy. One who takes no real interest in ultimate problems may yet argue hotly in favour either of teleology or of selection, whenever he comes in conflict with a dogmatic selectionist or teleologist. Hence, he may appear to be interested in the problem, whereas he is not so in reality. But we must dismiss all such superficial influences, when we search our own

minds to ascertain if we really wish for an explanation of life. We must also dismiss all the traditional teaching on the subject that we have received, and perhaps imparted to others. We must dismiss the belief that such a wish is natural to great minds. We must be content with our own mind as it is, when we seek to know and express it. It may be that the reader, having cleared his mind of all antagonism and tradition, will find that he posesses naturally the desire for an intelligible explanation of life, but it may be that he will find no such desire. If he finds his desire for explanation is strong, let him consider whether it comes from that general resemblance between organisms and contrivances, which led man to see a purpose like his own in nature. If he perceives that his desire for explanation is derived *solely* from this resemblance, it is possible that his desire will be lessened or even abolished.

It is evident that both teleology and the selection theory, and indeed all theories explaining adaptation, are alike in starting from the assumption that adaptation requires explanation. It has been said that the thing to be explained is a resemblance between organisms and contrivances, or more precisely, a similarity of organisms to contrivances in a certain respect. The wonder arises not so much from the fact that the two are alike, as that the organism should resemble the contrivance. The idea of contrivance is central in the mind and the organism is brought to it for comparison, so to speak.

Teleology, being an explanation of life, arises from the idea of contrivance and is therefore mechanistic in origin. It is, perhaps, here in particular that the reader

will feel inclined to contradict. Teleology is commonly regarded as the very antithesis of mechanistic belief. Let us pause for a moment to examine the mechanistic quality of teleology.

In order to perceive the mechanistic quality of teleology, we must distinguish the germ of the idea from what grows out of it. Teleology is mechanistic only in origin, there is nothing mechanistic in the mode of its simple development. It includes a desire for an explanation of adaptation and a simple method of satisfying it. Every such desire must arise from the mechanistic outlook on life, that outlook from which one sees organisms as things made, that outlook which depends wholly on the analogy of man the artificer.

The selection theory is similar to teleology in origin, but it is also mechanistic in development. It substitutes a process for a maker. In this respect it differs from teleology.

The need for final explanation is the mark of mechanistic philosophy, whereas the absence of such need is the mark of vitalistic philosophy. The special peculiarity of the outlook called vitalism, as I understand it, is complete indifference to cosmogony. Life is its own explanation, it is not in itself a problem.

As our knowledge grows our ability to control certain manifestations of life increases, but our ability to understand the thing itself diminishes. Life becomes less intelligible, not more intelligible, as we advance. We can understand life only if it is a thing made, the result of a constructive process. Why do we guess that it is a thing made, and whence comes our perfect confidence that our guess is correct?

Various writers, Spencer, for example, have pointed out that philosophy moves away from the comprehensible. He described the progress of philosophy as follows—"Instead of the specific comprehensible agency before assigned there is substituted a less specific and less comprehensible agency." [20] The truth of this seems obvious, but if so, what is to be the end of our various explanations of life? They cease in the thought that life is not a problem. But has such a thought no place in a normal mind? Is it a necessary thought that life is a problem? Is it a natural expression of every mind or is it on the contrary planted in the mind by tradition and fostered by constant repetition? The problem arises from a certain resemblance between organisms and contrivances, *i.e.* products of organisms. It arises from nothing but this resemblance. *It is on this oft-repeated point in particular that I am asking for correction.* Must we all be amazed when we observe that the form and activity of all living things has a general resemblance to the various products of human activity? If, seeing man as one with other living things, we are not amazed at this resemblance, is it necessary to correct our peculiar perception by education? The vitalist wishes to know what reality is, not how it is made. "There can be no consistent description of the process of creation, for the reason that there is no such process." [21]

That life is not a problem, in the sense that it does not call for solution, may be an unusual opinion; but it is, I believe, more common than is often supposed. Take, for example, the following passage, one of many of the same kind which might be quoted from contemporary literature. "Morgan's somewhat biassed and decided

inadequate discussion of the natural selection theory of the origin of regeneration seems to show his failure to recognise the need of naturalistic explanation." Now it is probable, I think, that Morgan did not see the need for naturalistic explanation. The absence of this need is perhaps unusual, but it is certainly not a matter for reproach. It is evident that naturalistic explanation depends entirely on the need for it. Whatever experience may be used as materials in the construction of an explanation, it is evident that the finished structure is founded on a certain need, that is to say on feeling or intuition. Now, it cannot be too strongly insisted that men differ from one another in intuition.

Both the teleologist and the selectionist perceive that purpose, considered somehow as a special human attribute, is present in every phase of life. The former expresses his perception openly and briefly. The latter expresses his perception by endeavouring to explain it away.

But what is it they actually perceive? They perceive a certain resemblance, nothing more, a resemblance between the results of human activity and the form and functions of organisms. Since they see a resemblance, it may be said for the sake of discussion, that they see a particular attribute called purpose, in both cases, in the man's activity and in all other manifestations of life. We need not stop to discuss the reality of this attribute, but we must insist that if it is real, they perceive it in both cases. Now, they cannot perceive more than this. They cannot perceive that this attribute, as present in man's activity, is a standard to which all other phases of life ought to be brought in order to ascertain whether they also contain this same attribute. Man did not

apply the name purpose to this attribute of his, in order to extend the name to any more of the same attribute which might be met with subsequently in manifestations of life other than human activity. It simply happened that the attribute noticed in man's activity received the name of purpose; hence, when the same thing was noticed in all other phases of life, it was also called purpose. In this way purpose, regarded as a human attribute, was perceived throughout life. But there is no justification whatever for regarding purpose as a peculiarly human attribute and being surprised because it is apparent in the rest of life.

From the vitalistic view point, purpose is not a human attribute present in life but a vital attribute present in man. If the reader thinks that there is no difference between the two statements he is, I think, greatly mistaken. I would remind him that the whole is greater than the part. Owing to what I regard as an error of perception, many see the part (the purpose displayed in human activity) greater or more important than the whole (the purpose displayed in all other phases of life). This error leads them to see a manlike purpose throughout life. There lies the source of their perplexity and their need for explanation. The misunderstanding has arisen because the name purpose was first given to the attribute, as seen in man's activity; and subsequently extended to the rest of life.

On the other hand, the strength of the vitalistic conviction that purpose or adaptation is not a problem, arises from the thought that the whole is greater than the part. The purpose displayed in man's activity is a small part of the whole displayed in life generally. If the

attribute is worthy of a name, the whole ought to receive it, not the part. Let us for the moment call it the vital principle instead of purpose, but let us do so *merely in order to obliterate its distinctive human appearance,* for there is nothing specially human about it. It belongs to life in general. Seen in this light there is nothing in it to explain, in the sense that teleology and the selection theory explain it.

Man has been obliged gradually and unwillingly to acknowledge the unity of life, but so long as he continues to wonder at adaptation he does not acknowledge that unity completely. He once thought that animals and plants existed solely for his benefit. Later he saw that all were descended from one stem, but still he holds himself so far from the rest of life, that he wonders that all life should be essentially like his own. He sees that animals are adapted, not only in their form, but in every phase of their activity. He knows that he himself is adapted in form and in every phase of his activity; but still he considers it wonderful that animals should display in their form, in their activity and in the lifeless products of their activity, that same adaptation which is so evident in the many lifeless products of his own activity. He sees a purpose, like his own, throughout the living kingdom and wonders at it; but only because he still holds himself apart from the rest of life.

All explanations of life, teleological or selective, supernatural or natural, become necessary only through this wonder. Unless we wonder at the purpose like our own displayed in nature there is no need for teleology; and since, as even the most ardent selectionists point out,

the selection theory or any other natural explanation of adaptation arises out of teleology, as a substitute for it, there is no need to construct such a substitute.

There is no need to assume that elimination is essential to the progress of evolution. We know from experience that elimination occurs on a large scale in nature, but it occurs more here than there or now than then, and not in a manner that would lead us to suppose that it is essential to the movement of evolution. If elimination is a necessary principle, the movement of evolution cannot continue without it. That is to say, evolution has already reached its climax in man as he now is. It is against this belief in particular that the mind rebels. We have nothing to guide our opinion but the thought of evolution occurring throughout the incalculable past, but that thought alone destroys the belief that evolution will cease.

The view advocated here that life is incomprehensible, that it does not in itself offer a problem, is very old. The teaching of the Christian Church that God is incomprehensible and also essentially manlike or comprehensible, is due, I imagine, to a wise recognition of the fact that men have different mental requirements—some requiring intelligible explanation while others do not. The unknown may be just as incomprehensible or comprehensible, just as impersonal or personal, as may be required by the individual. Some will regard this distinction as unjustifiable. However, precisely the same distinction is made in Hinduism, where it is more clearly recognised. The majority are to have intelligible gods, but some may dispense with them; and it is expected

that the more thoughtful, especially towards the latter part of life, should come to the conclusion that life is incomprehensible. This is mentioned by Max Müller,[22] and it is otherwise well known.

The opinion that life does not constitute a problem in itself is therefore far from being a new or local idea. That this opinion is held by a number of scientific workers is, I think, evident from contemporary literature. That the holding of this opinion does not diminish the activity of the worker is no less evident. Those who insist that life in itself requires explaining, seem to have somewhat of the mental requirement of those who insist that their God must be comprehensible. We shall return to this point in the last chapter.

The great objection to the idea that adaptation is not a problem will be expressed, I expect, as follows—'Adaptation not a problem. On the contrary that problem is and always must be the highest aim of biology. It has been called the mystery of mysteries. Your idea is repugnant to us, for it tends to limit our activity and we are nothing if inactive.' I am aware that many hold this opinion, but it seems to me that they themselves limit the field of inquiry. They select experience and value it according as it contributes to a certain problem. They reject a large part, perhaps the most important part, of experience as unimportant. Most of the discoveries, called beneficial, have been made in spite of devotion to the so-called ultimate problem, by those who have dealt only with the sequence of perceptible events with a view to control.

CHAPTER IV

TWO VIEWS OF EVOLUTION—SUMMARY AND ACKNOWLEDGMENT

LET us forget for the moment that organisms are adapted to their surroundings; and call to mind that they frequently change in quality, both individually and racially. Individual change is more familiar than racial change; but racial change is evident when we examine the various historical records, especially that afforded by fossils. The term evolution is applied to racial change in particular.

It is evident at the present day that all those who have had good opportunity of studying organisms in their various aspects, do not regard evolution in the same manner. This diversity of opinion, like other diversities of function, is inexplicable. The various opinions exist. Some last longer than others, and it is necessary to express them in order to know how widely they are represented in our own time.

Broadly speaking there are two ways of regarding evolution—

1. As something analogous to a constructive process and therefore as comprehensible and requiring explanation.

2. As reality, not requiring explanation.

These two outlooks are intuitive. We may talk for ever in support of one or other opinion, but we cannot account for the difference in outlook, of which they are expressions. Though both occur side by side as at

present, the one will no doubt replace the other eventually. The dispute must be settled in time, but arising as it does from the mental quality of man himself, it cannot be decided by means of evidence. We know from experience, however, that disputes are decided in time. This view does not lessen the energy of discussion, it does not hinder us from expressing ourselves; but it lessens the acrimony of discussion.

Let us consider in succession these two ways of regarding evolution—first the view that evolution is analogous to a constructive process. In this or other analogy lies our hope of comprehending evolution, for we habitually comprehend with the help of analogy. Whenever we understand anything we say—'it is like so and so,' mentioning something familiar. So we commence our attempt to understand evolution by assuming that it is like a constructive process. Let us now see what follows from this assumption.

The two most obvious attributes of a constructive process are as follows:—

(1) man is the cause of it;

(2) it has an end or climax.

Both of these attributes are retained in the concept of process, when that concept is taken as a model of evolution. It is often implied, though seldom stated, that man is in future to be the cause of his own evolution; from which it follows that evolution will have an end. Let us pause for a moment to repeat that these are the two chief attributes of a constructive process and then pass on to consider how evolution must cease when man becomes the cause of it.

However or whenever man may be, there must be for him a past and a future. Now, those who regard life as analogous to constructive process believe that man will gradually obtain more and more ability to know the future and to make the future from his experience of the past. This view arises from the thought that man has to-day more ability to foretell future events than he had centuries ago. Therefore if man's power to foretell and control is increasing, it will eventually become extended to the movement of evolution. This is a common argument, but if carried out it is the very negation of evolution. It sees those generations that lie further on in time determined by those generations that lie further back in time. That is to say, it sees the former resembling the latter; inevitably, *since each individual favours only his own type.* This means the cessation of change, later generations being determined by those which precede them and therefore resembling them. If later generations were to be different from their antecedents, it is evident that the new qualities in which they differed, would not, in any sense of the word, be *made* by those antecedents. The antecedent generations would not be able to imagine those qualities, if they were actually to be new. Even if they caught a glimpse of new quality in stray untimely individuals, they would strongly disapprove of it, simply because they themselves did not possess it. There seems, however, to be a growing opinion that the quality of generations which lie further on in time, is to be determined for them by generations which lie further back in time. The least practical of the various eugenic ideals leads one to imagine later generations as grateful to their ancestors for making them

what they are, and firmly resolved that their own descendants shall be still more so if possible. That is to say, it leads one to imagine evolution at a standstill.

But from the vitalistic point of view, evolution is regarded as the becoming of new qualities in organisms, as unceasing. No analogy can be found for it, hence it is unintelligible in itself. Man is a part of it, and hence cannot grasp it. We can know of it historically. We know, or rather we agree in assuming, that *some* of the organisms which lived during any past period of time, possessed qualities which did not exist in *any* organisms of the preceding periods. Hence a continuous becoming of new qualities occurred, and this is what is meant by evolution. A survey of the past leads to the belief that evolution will continue, that the new qualities will be different from the old, unforeseeable and unpreventable by the old, uncomformable as regards quality with any law or generalisation constructed out of the old, of that which arrived before them.

We have the same reason for believing that evolution will continue in future as for believing that the sun will continue to rise in future. The contrary belief that evolution is comparable to a constructive process involves the assumption that evolution will be controlled by man and therefore cease as a spontaneous movement. According to this view the becoming of new qualities will cease. They are to be prevented perhaps by the possessors of the older qualities. Such an attempt would necessarily be made. We may be sure that the possessors of old qualities, throughout past time, endeavoured to prevent the establishment of the possessors of newer qualities, but without success. The new was different from the

old, and arrived in spite of it. It is unthinkable that the new or later in time should be produced by the old or earlier in time. The part played by the old has always been to *hinder* the arrival of the new, not to determine the new.

The opposed views may be summed up as follows. Some look forward to the abolition of spontaneity. A spontaneous event is unforeseeable and uncontrollable. The time will come, they believe, when such events will no longer occur. In their estimation spontaneity is temporary, an expression of our ignorance. But the others see spontaneity as evolution itself. If spontaneity is abolished, evolution is thereby for ever at an end. Perceiving this and relying on their knowledge of the past, they regard spontaneity as inevitable and desirable.

Some believe that evolution, even now, is not quite like it used to be. The following view is sometimes expressed, though not perhaps in the following words: 'For many millions of years evolution has been guided by natural selection, but in my lifetime I have noticed a change coming over the process. Comparing the duration of a man's life with that of the earth, we may well speak of this change as sudden. The change is as follows—Evolution which has been conducted for so long by natural selection will be conducted in future by intelligent men. The present century is to be the most important in the history of the earth.'

It is strange that this opinion is usually accompanied by an objection to sudden changes in the process of evolution. It is unlikely that this opinion, if actually held, will persist. It is just as easy to believe that the

sun will rise to-morrow by a new cause operating for the first time, as to believe that there was a cause for evolution which suddenly became replaced by another. The objection to such replacement is expressed in the following passage—" Whose whole theory (Darwin's) crumbles to pieces if the uniformity and regularity of natural causation for illimitable past ages is denied." [23] It is not certain that any of our conceptions of cause are adequate or even necessary, but it is very certain that life cannot have had a cause which suddenly became changed.

Herbert Spencer and others had difficulty in imagining how selection got a start but found consolation in the thought that "natural selection must have become increasingly active when once it had got a start." [24]

Are we then to imagine natural selection gathering force throughout thousands of millions of years, fashioning the myriads of strange forms known to us from fossils, finally producing intelligent man and then suddenly ceasing, because, as some say, its last product became too squeamish to allow it to continue?

All such views arise because intelligent man is liable to regard himself as the last organism, the product of a maker or of a process resembling manufacture, and hence as something finished; whereas he is merely the latest, one of an infinite series. At least, so he appears to those who perceive evolution as reality.

If the reader has followed me so far, he will now be acquainted with the chief proposition of this book. The proposition is dogmatic in the sense that it does not rest upon demonstration, but it is offered merely as an expression of opinion, for the consideration of others. Before

concluding, we will summarise it, in order to avoid misjudgment.

It is proposed that man is actually a part of life not distinct from it in any essential respect. It is, therefore, erroneous to regard human activity as special and distinct in kind from the activity of other life. This error is expressed whenever we speak of human activity as purposive, at the same time implying that the activity of other life is not purposive *in itself*. This has led many to see 'a purpose like our own,' not actually belonging to life itself but outside it, permeating it so to speak, shaping it for an end and compelling it to behave in a purposive manner.

It is proposed, here on the contrary, that purpose is not an attribute which is specially and particularly the property of man, but an attribute belonging to life in general. It is a vital attribute, hence man is endowed with it.

If we believe in evolution, we must also believe that life was purposive long before man appeared on earth. It would have been impossible in those days to have explained purpose in terms of human activity; how is it possible and why is it necessary to do so now?

The purpose, perceptible everywhere in nature, ceases to be a wonderful thing when we understand that it is not a human attribute in the first place. If we do not see purpose as special to man, we can have no inclination to imagine it as taken out of human activity and placed alongside life in general, in order to account for what is called the purpose displayed there. The reader will notice that I am here speaking of purpose as though it were a material thing. I do not of course believe that

it is so, but it is necessary to speak of it as such in order to express my meaning. *To take the purpose out of human activity and to place it alongside life in general, in order to explain the quality of the form and activity displayed there, is what the teleologist does, so far as I understand.* But to do so seems unnecessary. Similarly, it is unnecessary to imagine the destruction or elimination of vast quantities of more or less purposeless substance, in order to account for the purpose expressed in nature, since this need not be accounted for. If teleology is unnecessary, the selection theory is also unnecessary, for the latter arose out of the former and has no meaning or value except as a substitute for it. It is necessary to explain the purpose displayed in life, only when that purpose is regarded as a special human attribute. To explain purpose or adaptation is said to be the ultimate problem of biology and certainly if we ignore that problem it is difficult to imagine any other ultimate problem. But this old problem is, I believe, entirely due to the custom of regarding purpose as a special human attribute.

It is impossible to prove that purposive activity is not peculiar to man, but it is easy to illustrate the fact. The primitive man who dresses his body with leaves or feathers in a particular manner, his customary manner —covering some parts and leaving others exposed,—is not behaving differently in any essential respect from the crab which dresses its shell with weed in a particular manner. The two modes of behaviour are not so different that one can say with confidence—this is purposive, that is not purposive.

The animal, which makes a nest out of convenient lifeless material, is not behaving differently in any

essential respect from the primitive man, who constructs a hut in his customary manner. It may be said that the man frequently changes the style and material of his hut, whereas the animal does not do so. But we know that man has usually an ingrained objection to change his customs and we also know that an animal may do so. For example, a crow, whose ancestors no doubt habitually built their nests with twigs, has been known to build almost entirely with the wire from soda-water bottles, when such waste material was plentiful. The building habit is not special to man and the higher animals, it occurs of course in the lowest protozoa, in Difflugia for example.

Both men and animals save themselves from harm precisely in the same manner, in the same circumstances. If we cannot see any difference in two modes of behaviour, we should not say that the one is purposive and the other not so. A good example of this is provided by the following daily occurrence. There is in the suburb of a tropical town a newly constructed electric tramway. The intervals between the lines, being spared from traffic, are covered with rich grass. The track is frequented by grass cutters, usually elderly women, and by cattle; the former to cut the grass for stalled animals, the latter to graze on their own account. The ancestors of neither had any experience of electric trams. On the approach of the tram the behaviour of both is exactly the same. The work of removing grass is continued by the grass cutter or by the cow until the tram is quite close, when they move without haste on to the other track alongside. Neither shows sign of fear, and as a rule there is little interruption in the process of grass removal. But when

two trams approach simultaneously from opposite directions there is some agitation in both cases, since the event is unusual and it is necessary to get clear of both tracks until the trams have passed. In the above case, both man and beast behave in exactly the same way in similar circumstances, and it is scarcely possible for any onlooker to think that the one moved by purpose, while the other moved by something other than purpose. I am speaking only of the safety-seeking movement in both cases. The man and beast are not of course alike in mind. The fact that the former could imagine the result of not moving from before the oncoming vehicle, while in all probability the latter could not do so, is independent of the fact that both possess the same purposive safety-seeking activity. If they did not possess it, neither of them could live.

Purpose is not something confined to the activity of man, it is something occurring throughout the whole of life or it is nothing at all. We can hardly say that it is nothing, since life would not be life without it. Purpose is often regarded as an *invisible* manlike agent which dwells outside life and influences it, but this is merely because man is so certain that he himself is the only *visible* organism with real purpose of its own. This manlike purpose, which is not life itself but dwells outside it, is the original and only unnatural causation of life. In order to find a substitute for it, we are urged to distort our actual experience, to neglect the obvious and believe in the obscure. We are to prove that life is due to some cause other than this unnatural one. We are to spend time in proving that life is due to natural causation, even though we can see clearly that it is not due to

unnatural causation. It is important to know whether this is to be the aim of science or not.

If we are so obsessed with the thought that purpose is man's own peculiar attribute, rather than a general vital attribute, perhaps it would be well to speak no more of purpose in nature and so avoid confusion. But if, on the contrary, we are able to see purpose as life itself, as man's antecedent by untold millions of years, we may well retain the term.

The argument can be summed up in a few words. The so-called fundamental problem of biology seems to be not more than the question, "How is it that purpose, which is the special peculiarity of human activity, is apparent in every phase of life?" The self-contradiction contained in such a question is obvious. The question depends wholly on the assumption that purpose is an attribute peculiar to human activity, while indicating that it is actually not so. It states, in the same breath, that purpose is special to human activity and also that it is not special to human activity, since it is perceptible throughout life.

Before concluding this chapter and with it the chief subject of the book, I must mention that much of the foregoing was suggested to me by reading Bergson's 'Creative Evolution.' Although that work has aroused wide interest, I have had small opportunity of hearing it discussed and have seen only a few of the written comments upon it, enough, however, to know that the general opinion concerning it is decided and conflicting. So far, I have been unable to understand some parts of the book, but the account of evolution is quite clear and

to me of the utmost value. Take, for example, the following passages—

"If, on the contrary, evolution is a creation unceasingly renewed, it creates as it goes on, not only the forms of life, but the ideas that will enable the intellect to understand it, the terms which will serve to express it. That is to say that its future overflows its present, and cannot be sketched out therein in an idea." [25]

"The spontaneity of life is manifested by a continual creation of new forms succeeding others." [26]

"We must get beyond both points of view, both mechanism and finalism being at bottom only standpoints to which the human mind has been led by considering the works of man." [27]

"Mechanism reproaches finalism with its anthropomorphic character, and rightly. But it fails to see that itself proceeds according to this method—somewhat mutilated; . . . it also holds that nature has worked like a human being by bringing parts together." [28]

These passages have been selected in a few minutes by opening the book here and there, but they represent what is, to me, the essence of 'Creative Evolution.'

I know clearly what is to me the essence of Bergson's teaching, but having read the comments of others on that teaching, it seems unwise to assert that what I have derived from it, is its essence. I may have been led by my enthusiasm to lay undue stress on particular portions of the book. To do so is quite common. This doubt occurred when it became evident that others had estimated it differently. Take, for example, the following opinion of one whose attitude towards 'Creative Evolution' is on the whole sympathetic, and who is probably better

acquainted with the literature of biological theory than myself.

"A very subordinate additional possible ground for vitalism may be mentioned here. It may be held that combinations which have in fact never been produced before are frequently appearing in living things. This idea seems possibly in part the basis of Bergson's vitalism. Owing to the almost infinite number of variable factors involved in biological processes, it appears not improbable that this state of affairs actually holds." [29]

Now, it is evident that what the writer of the above passage regards as "possibly in part the basis," I regard as the very essence. After walking round a museum where fossils are displayed, it is easy to believe that combinations which were never produced before, frequently appeared, epoch after epoch among living things. It certainly appears not improbable that this state of affairs actually held. Difficulty is felt only when we try to imagine that this state of affairs does not hold at present, and will not continue to hold in future.

It is necessary to point out that opposed points of view are often called vitalistic. For example, Bergson teaches that life itself cannot be explained, *i.e.*, dealt with by intellect. Driesch teaches that since life cannot be explained mechanically, therefore it must be explained teleologically. Rightly or wrongly, this is how I understand these writers. They differ greatly, yet both are called vitalists. They are alike in holding that life cannot be explained mechanically, but they differ fundamentally as to the possibility and necessity for explanation.

The teleologist and the selectionist are alike in outlook,

they must have an explanation of life. The vitalist does not need one. The first duty of an explanation is to be intelligible, that is to say anthropomorphic. An intelligible and final explanation of life is only possible on the assumption that man is a finished article. That is to say, it is made possible only by denying evolution.

To the vitalist, life in itself is sufficient. He sees that the more obvious the explanation may be, so is it the more false. If then he has an explanation at all, it is absolutely unintelligible.

That it is possible for the mind to be certain in regard to an object of belief that is utterly indefinite was mentioned on page 49 and illustrated on page 47.

Those who are content with their unintelligible vision, which is not an explanation, those who are satisfied with their ignorance, beyond a certain point, have expressed themselves clearly in literature for many centuries. In India especially their outlook has been regarded as more mature than the other. The individual is expected to grow to it.

CHAPTER V

EXPLAINING WITHOUT EXPLANATION

In the preceding chapters it was proposed that life in itself could not be understood or explained. But the reader will think perhaps, that this last chapter reveals some desire on my part to explain it. This apparent inconsistency is due to the fact that words, such as understand and explain, may be used in more than one sense. For example, we shall continue to explain life for the very reason that it has no (final) explanation. We shall understand it more and more, simply because we shall never be able to understand it (completely).

Every theory or explanation of life must be a structure of the human mind, and like all structures it must be definite and complete. Hence, no theory can be intimately or extensively related to life, since whatever life may be it is neither definite nor complete. If the human intellect, which is undoubtedly a part of life, were to understand life, the part would as it were grasp the whole, which seems impossible.

Although it is not possible to discover an explanation of life, yet we shall not always regard it as at present. We shall see more and more in it. We shall get to know it more and more intimately. If to do so is to explain, then undoubtedly we shall explain life. But this is not what is commonly meant by explanation. The selection

theory is usually regarded as an explanation of life, indeed it is a typical explanation. It is not a mere description of certain experience. It is an infinite extension of certain experience. The current objection to the theory, from its birth to its death, has been and will be, that it is an explanation of life. If it were not so, no one would object to it.

All explanations of life are attempts to answer questions such as,—How was it made? How did it become? But we do not know that it was made. We only know that it is. The problem of life is to know how it is, not how it was made; not to seek for an explanation of it, but to go on explaining it.

This chapter will contain an attempt to explain a little, to indicate what I perceive, in order to ascertain if others perceive it likewise.

In some respects we are to-day in the same position as the most primitive human beings imaginable. We are conscious of nature, that is to say of all that lies within the sphere of sense and reason, and we are also aware of what may be called supernature, that which lies outside the sphere. Similarly, it seems that a being, who was as much above us as we are above the speechless animals, would also be conscious both of nature and supernature. His sphere of nature would be much wider than ours, but there would still be for him a supernature.

A man may say 'I propose to ignore all that lies outside the sphere of sense and reason for it is a delusion,' and so may take up a position diametrically opposite to those who have held that the world of sense and reason is delusion, to be ignored by anyone who aspires to know

reality. It seems to me that both positions are conven tional, that neither can be occupied to the entire exclusion of the other by any human being. The one belongs more to the busy worker, the other to the aged recluse. But no man can deny supernature for he is cognisant of it, and even the most accomplished transcendentalist must sometimes be troubled by his senses and reason so long as he lives. Neither supernature nor nature can be regarded as not existing. Our realisation of evolution makes us more than ever aware of the two spheres. If we hold to our belief in evolution, we must regard humanity as incomplete. We must therefore feel the limit of our perceptive ability and so realise that which is outside the limit. It is only when we fail to realise evolution, when we feel ourselves to be perfect, complete and finished, a delusion which comes over us at times in spite of our knowledge to the contrary, that we speak of what is outside the limit of the senses as though it were not.

Some seem to have more difficulty than others in foreseeing the being of the future who would be in a position to subordinate them, to the extent that they themselves subordinate primitive man.

That which is outside sense and reason has been far more talked of than anything within. Man has tried to define it in many ways and often to find in it an intelligible cause for the origin of life. Perhaps the majority of people must have some such intelligible explanation, but there are some who do not require it. These constitute the opposed parties in the great dispute, whether that dispute be among theologians or among scientists or between the two.

Our various attitudes towards supernature are as

many as there are minds in the world, but this infinite variety, as partially expressed to-day and in the past, is not devoid of all order. The items of which it is composed, that is to say the individual minds, are such that no two are exactly alike, but some are more alike than others and some appear to have definite qualities, which are not present in others. The individuals may, therefore, be imagined as arranged in groups according to these qualities, groups of greater or less magnitude.

Let us pause for a moment to illustrate what is meant by grouping. Mankind could be clearly imagined in two groups, an immense group and a very small group, according to whether individuals were able to distinguish some particular colour or not. The colour sense and the colour blindness would be the mark of a large group and a small group respectively.

In the same manner, mankind might be grouped according to their attitude towards supernature. It is, however, scarcely possible to carry out the process of division and sub-division. No two persons would agree over the subdivisions. But there are, I think, at least three groups which are so clear that the particular instinct or intuition, constituting the mark of each group, may be defined. In the past and at present, there are three principal methods of representing supernature, or three attitudes towards it, which may be defined as follows—

1. (The visible.) This attitude towards supernature is connected in some degree with a visible and tangible object.

2. (The comprehensible.) This representation is not connected with any visible object in any degree, but

relates to some entity which is clearly imagined or clearly understood, in terms of some analogy in nature.

3. (The incomprehensible.) This has no relation to anything or any idea that can be seen, imagined or understood.

These mental attitudes are instinctive and intuitive. An instinctive thought or action is untaught. An intuitive thought or action is untaught and unreasoned. The words intuition and instinct seem to have almost the same meaning, the former being applicable to humanity, the latter to the rest of the animal kingdom.

We speak of particular instincts, as impulses to particular kinds of action, hence we may also speak of particular intuitions, though it is perhaps unusual to do so.

The argument of the present chapter depends on the assumption that there is no essential difference between such intuitions or instincts and all those other innumerable characters or qualities which together make up organisms. Each quality, character or instinct is, of course, a different thing; but the relation of each to the whole, as a part of the whole, as something which may be present in or absent from given individual organisms, is essentially the same. If we may speak of brownness of the eyes or curliness of the hair as definite qualities or characters, definite only because they are present in one individual and absent from another, then also may we speak of mental qualities as definite, whenever they are clear enough to be recognised in similar circumstances. We need not insist that characters are real definite things, though like many other realities they are liable to become

so from mere habit. But it is useful to regard them as definite realities.

This way of looking at life, which came into prominence through Mendel's discovery, has already proved its utility in the improvement of domestic races, and it will I think be useful in many other ways. It is even a useful principle in social intercourse, providing us with an unshakable argument for toleration. Why should we endeavour to change the quality of other minds if that quality is like any other organic peculiarity? We do not wish to change the colour of our neighbour's hair, why then should we wish to change his opinions if they are expressions of his actual mental quality?

Having made this preliminary defence of the extension of the principle of discontinuity, we will return to the three so-called intuitions as defined above.

The members of the second group have the instinctive desire to exclude the visible and tangible from their realisation of supernature and similarly the third group have the instinctive desire to exclude the comprehensible. The same objection is raised in both cases. The second objects to the first and the third objects to the second on the ground that the method of representation chosen is *much too obvious.*

Although judged from the strict standpoint of any one of these instincts the other two are atheistic, in the language of aggression, and although these instincts are the fundamental motives of religious controversy, though not of religion, yet none of them is the special property of any particular system of religion. A system which was fully catholic would embrace all three. Some systems,

however, seem to have arisen from one of these instincts, the limits of the system being in accordance with the instinct as defined, at least on one side. For example, Judaism or Mohammedanism would rigorously exclude those who make use of any visible or tangible representation whatever. Thus they would be defined on the one side in accordance with the second instinct but not on both sides. They would not, I imagine, exclude the transcendentalist unless, as is unlikely, he was otherwise troublesome.

It is impossible to know if every person is actually provided with one or other of these instincts. It seems certain that they are present in many cases, but it is uncertain whether one or other instinct must be present in every person. It is impossible to decide this question since the imitative faculty of man is very strong and causes great confusion. It would be quite possible and I believe it is not unusual for a person to behave as though he had a particular one of them, when in reality he has one of the others.

They are termed the first, second, and third in the belief that they represent stages in the development of mind; the second being more mature than the first, the third more so than the second. It is a historical fact that the second has largely replaced the first, but it is an assumption on my part that the third will eventually replace the second, an assumption which will appear fair to some and unjustifiable to many others. No one, however, can decide such a question, though it will be decided in time.

We will now amplify each of the above definitions in turn.

The sign of the first instinct is a tendency to regard the supernatural as connected in some degree, however small, with any visible and tangible object whatever. The group would therefore include those who rely on their imagination almost entirely, but yet strengthen it with the help of some representation, visible at the moment, when the mind turns to the supernatural. The group would of course include the primitive man, who allays his vague feelings of fear and perplexity, with the help of some visible object. It would include even the child, who finds comfort from the terrors of night with the help of some small fetish from the toy shop. Night is to the child the approximation of supernature. In the absence of light and sound, nature, which comes through eyes and ears, shrinks. Supernature, the unknown terror, looms up, but it is held off by the fetish.

The first instinct is therefore present in many grades, but we know for certain that it may be absent, practically speaking.

In speaking of this instinct as the first, I do not mean that it was actually the first of any natural series, but merely that it was more primitive than the other two mentioned.

Let us now turn to the second instinct and see how it is marked off from the third. It is here in particular that I shall lose the sympathy of some of my readers. They will doubtless agree that a visible representation of supernature is impossible, unnecessary or even repugnant; but they will insist that an intelligible representation of it is a necessary requirement of every right-thinking person, and will repudiate the suggestion that such is unnecessary to every one.

The group of the second instinct like that of the first is manifold and graded. The instinct as defined above is apparent, I think, in many persons at the present day. Their minds must have something imaginable or intelligible to rest upon. For example, the instinct is evident in those whose representation of the supernatural contains the attributes of king or of an artificer, but it is also distinctly expressed in the appeal of the true selectionist, "We must not abandon our belief in natural selection; what else have we?" As judged from their writings, some are true selectionists in this sense.

No one will dispute that this group is manifold, but many will deny that it is a group at all. They will deny that the limits of the group are perceptible. Let us consider the first of its supposed limits. Is it not true that primitive men must have a visible object either to aid imagination or replace it entirely in their dealings with the supernatural? And is it not also true that most civilised men have no such requirement? Mankind is undoubtedly divided on that point into two groups. But if so, how can we be sure that this is the only point of division? Let us at least consider the possibility of the second limit. To some it will be as clear as the first, but all will not perceive it; only those who feel or know instinctively that an explanation cannot be both intelligible and final and are naturally satisfied without an explanation.

It is probably true that the majority of persons at the present day must have something which they can imagine or understand as a representation of supernature. They may not be satisfied even with the latest formula, but they show clearly in their arguments that they require

some all-embracing explanation of life, and they seldom realise the fact that at least some of their contemporaries have no such desire. The distinction between these two mental requirements, however, has long been recognised by philosophers and theologians. One who insists that his representation must be in analogy with nature so that it is imaginable and intelligible is called a theist; while he who insists that his representation must have no analogy in nature is called a deist.[30]

Neither instinct depends on reason or argument and they are only apparently transmitted by teaching. They simply exist. By reason and argument we express and elaborate them and often endeavour to impress them on others. Though less recognised they play the same part in biological discussion to-day as they have long played in theological discussion. But all that results from them ought to be excluded, I think, from science, especially as taught in the class-room. We cannot impress upon a student the value of entelechy or the selection theory, unless he has the instinctive need for it. A number of students having what I call the third instinct are not able to take any real interest in such explanations, although they may appear to do so through dislike of being thought singular, or they are obliged to do so in order to pass their examinations.

Let us now deal with the third instinct in more detail.

The earliest and clearest expressions of it are to be found in the sayings of the monistic philosophers of ancient India. So far as I understand them, they realised supernature in the following manner. 'To know it, ask yourself, Is it this, is it that? and continue the process until you have mentioned every item that can be seen or

thought of. After each item repeat the word No.' Thus they learnt of the limit of the senses, of the finite, that which is within the limit of sense and reason, and also of the infinite, which is outside that limit. They spoke of both finite and infinite together as one, by the Sanskrit word *Atman*, which Max Müller translated as " the Self " and considered to be equivalent to the word Brahmam (neuter) and practically equivalent to the word Life. In contrast to the modern custom, they strove to minimise the importance of the finite, to such an extent that often when speaking of the Self they seem to mean the infinite alone. They regarded the finite as part of the infinite and influenced no doubt by the thought that the whole is greater than the part, they fixed their thoughts on the latter. In so doing they were encouraged perhaps by their surroundings, which tend to make men inactive, in our sense of the word.

The following quotation from the Talavakara Upanishad is an expression of what is defined above as the third instinct. It is not selected at random, but is, I imagine, typical of what in these ancient sayings has appealed strongly to some Europeans, among whom the name of Schopenhauer is perhaps the best known. " He by whom it (Brahman) is not thought, by him it is thought; he by whom it is thought, knows it not. It is not understood by those who understand it, it is understood by those who do not understand it." [31]

There is, I think, a striking resemblance between this saying and the following—" The intellect is characterised by a natural inability to comprehend life " (Bergson [32]).

The first quotation is a definition of life. The second is a definition of intellect. But both definitions contain

a statement of the relation between Life and human intellect, and that statement seems to be precisely the same in both cases.

If we consider that the last quotation might almost be called the motto of a philosophy, which is arousing considerable enthusiasm at the present day, we may perceive that this thought or instinct is probably more widely represented to-day than ever before, though it was first expressed over three thousand years ago.

The Upanishads were translated by Müller from MSS. probably of the eighth century A.D. The sayings, however, come down from a very much earlier date. According to Müller, who is always cautious and gives good reasons for his opinions, we may be sure that they were composed before the time of Buddha (600 B.C.), though how long before cannot be ascertained. But even as they stand these sayings contain passages such as "Thus we have heard from those of old who taught us this."

The idea of the infinite as a reality which must necessarily be incomprehensible was therefore expressed some thousands of years ago. This idea is the expression of the third instinct as defined above, which is therefore of great antiquity.

Some readers may think that the phrase "incomprehensible reality" is self-contradictory and will find this discussion meaningless. It is well, therefore, to pause for a moment and explain. If a reality is rigidly defined as some visible or comprehensible thing, it follows that the above phrase is self-contradictory. The word reality, however, may be used in another sense, for anything regarding which there is a large consensus of perception —*i.e.* many minds are alike in perceiving. For example,

the reality of a material object lies in its being perceived by all, rather than in any one person being certain of it. If the reality of an object lay in its being clear, the objects of delirium would be real, for they are quite clear enough to be picked up and handled. Even touch does not correct the error of vision in some cases. This is well seen in alcoholic delirium.

Hence, the phrase 'incomprehensible reality' has a meaning in one sense and to use it in this sense is merely to make the assumption that a large number of minds are alike in a certain respect, namely, in being aware of that which lies outside their senses and comprehension. The reality of 'that' lies in the consensus regarding it. But let us return to the point.

We cannot give a list of the names of those who have insisted that their conception of the supernatural must be incomprehensible, that no explanation, in analogy with nature, could possibly satisfy them. The list would be much too large. Max Müller, with others no doubt, pointed out that the method of defining the supernatural by No, No,—the negative method as he called it—belonged to some of the Greek philosophers and also to the earliest Christian writers, many of whom he thought would be condemned as agnostics by modern theologians (in 1892).

In his 'History of Philosophy,' Lewes pointed out the general resemblance between the philosophies of Spinoza, Schelling, and Hegel. The 'Substance,' 'the Absolute,' 'the Idee,' all express the same concept, which is scarcely to be distinguished from the *Atman* of the Brahmans. All are alike in holding that It must be incomprehensible.

It is quite impossible to mention all those modern

writers who speak of the infinite, the absolute, and the unknowable, including, we have seen, both Spencer and Huxley, and in so doing express their instinctive belief that final explanation is impossible. There seems no doubt that some find in the thought that final explanation is impossible, *that very same satisfaction*, which others obtain in the thought that such and such an explanation is clearly imaginable or intelligible and practically final. The difference between these two mental requirements is the difference between what is defined above as the second and third instincts.

It is well known that the history of a race is repeated to some extent in the development of each individual. The traits of primitive man are perceptible among the childhood of the more advanced races. If these instincts are stages in the development of mind, they ought then to be repeated in the mental development of each individual. There is, I think, some evidence that this actually occurs. The satisfaction which quite young children obtain from particular toys, especially when left alone at night, is quite comparable to the use of a fetish by primitive man. In both cases, vague fear and perplexity are soothed by the object. But the young adult has no further use for a fetish. Its place is taken by some definite theistic concept, something familiar or comprehensible, an explanation of life. By some such means perplexity is soothed, the mind finds rest and does not range further. But the mind does not necessarily stop there. A time may come when it finds satisfaction in life without understanding it, when life is its own explanation. Some, however, will hold this to be impossible, will deny the reality of the

third stage and deny that the second stage is peculiar to the young adult. There is undoubtedly truth in their denial, yet it is well known that the more concrete forms of religion appeal with greater strength to the young adult than to any other section of the community. The 'revivalist' seeks out the young adult.

It is unlikely that the reader will be easily persuaded of the reality of these instincts. He will doubtless agree that the instinct of fetishism is present in primitive minds and also that it is generally absent from the more advanced minds, and therefore he may be willing to admit the reality of the first instinct, as something which is present or absent, practically speaking. It is less likely, however, that ne will allow the reality of a further step in the same direction. It seems evident that the first principle of modern science, as well as of the more definite forms of religion are expressions of the second instinct. The first instinct is towards a fetish. The second instinct is towards some intelligible concept which is needed to allay a certain perplexity, a part of the very existence of some. This requirement undoubtedly appears to be a motive of modern science and we must inquire whether it is so or not. Is it impossible for the mind to regard life without perplexity? Is there any other perplexity in life except what arises from the instinctive thought that life must be due to a constructive principle. But does not this instinctive thought arise merely because man holds himself somewhat apart from the rest of life? Surely he seeks for a constructive principle to account for life, merely because he regards constructive activity as peculiar to man and is perplexed whenever he sees what appears to be evidence of it elsewhere. He endeavours

to explain life in terms of man, but only because he regards man as apart from all other life. Unless he makes this distinction he cannot want an explanation of life, for there is nothing in it to explain, it causes no perplexity in itself. Max Müller spoke very truly when he said, " With all my opposition to Darwin, I have really gone *far beyond* the point where he stopped, for I have always treated man not only as a descendant of an animal, but as to all intents and purposes an animal." [33] Darwin, on the other hand, saw man as something apart from the animals. He imagined the purposive nature of his activity as quite peculiar to man, so that when he perceived the apparent effects of purposive activity elsewhere throughout life, he required an explanation of it. Because there was no explanation in Lamarck's book, he spoke of it with strong disapproval.[34]

From a detached point of view there is not a pin to choose between the three instincts. We can only say that the first is almost extinct among civilised people, and we may perhaps believe that the second is in the process of becoming extinct, but we cannot actually know it. We cannot know that the third is the natural successor of the second. The feeling that life is its own explanation, though very ancient and very modern and indeed very persistent throughout history, may be freakish, a mere peculiarity of certain eccentrics. In no case could a man be taught to receive one or other instinct. The mind seems to be in one or other state and may pass from one to the other, but usually in the order indicated.

The fetish worshipper may pass to the more definite dualistic standpoint of the second instinct, but change does not usually occur in the reverse direction. Similarly,

I believe, a man may pass from the dualistic outlook to the monistic, but the return journey is scarcely possible.

It will be noticed that what is here called the second instinct is what is often called dualism. It regards existence as in two parts, an inert part and an active part, the latter constructive, controlling and compelling, that is, essentially man-like. It sees everything and the cause which it must have, matter and force or power, protoplasm and natural selection, nature and the natural laws which it obeys, life and some unknown explanation of it which is yet to be discovered. On the other hand, what is here called the third instinct, is what is often called monism. It sees life without an explanation, as its own explanation. We may of course assume that life has its causes, but this is only for practical purposes. We may assume that there are strings which work it, like the strings of the marionettes, but only that we may be able to control it for our benefit, so far as possible.

It is evident that this book is, so to speak, an expression of the third instinct, viz. that life cannot be explained in itself, there being nothing in it to explain. We shall get to know it more and more intimately but never shall we say 'at last we understand it, that is the explanation we have long been seeking.' I have no wish to recommend this view to others who know their own minds and are not of my way of thinking. I am led to emphasise it because I believe that it is far more common than is often supposed. It is traditional that science should seek for an explanation of life. It is therefore traditional that there must be an explanation, known or waiting to be known. But is it more than a tradition? Is it a real requirement of many minds or of only a few? What is

our real motive in searching for such an explanation? Is it the actual requirement itself, or is it that we heard when young that life was a mystery, that great minds saw in it mystery, that it was the custom to search for this mystery and that if we found it we should be praiseworthy? I believe that the motive for the search lies more in these secondary considerations than in the actual instinct or need for explanation. In other words, I believe that the second instinct, as a reality, is already half extinct, though the fact of its extinction is obscured by tradition and custom.

The feeling that life in itself has no explanation must, I think, necessarily accompany the full realisation of evolution. There are two ways of looking at evolution. In the more academic view, intelligent man is regarded as a finished article made by natural selection, but this is not the realisation of evolution, as expressed in writings such as Bergson's. There and elsewhere we find the idea of evolution as a movement which continues. From this point of view supernature is not a constructive and controlling agency, but rather the endless path of man's further evolution. We cannot say that it does not affect us, though we do not know how it affects us. But we shall move to know it more and more, without ever knowing it fully. It seems distinct from nature when both are thought of at a moment, but otherwise the two are continuous in time. Supernature and nature therefore appear to be one, as many have variously insisted. Yet it is not even like a path, for man's evolution is the increase of his perceptive ability, the expansion of what is to him nature, that is to say, an encroachment upon supernature. This is based on the assumption that the

sum total of man's perceptive ability is wider than that of the lower animals, that nature is to him more extensive than to them.

Before concluding, two principles must be further defended.

1. The importance of intuition in human affairs.

2. The practical importance and indeed the necessity of regarding intuition and all evolution as discontinuous.

Let us briefly consider the first of these. It is most interesting to notice that two such influential writers as Spencer and Bergson, whose teachings are the very opposite, should be in agreement on this particular point. The subordination of intellect to intuition is at the basis of Bergson's teaching, and Spencer wrote a special essay on this very subject, in which we find, "When it is said that the brain is the organ of mind, it is assumed that the brain is chiefly, if not wholly, the organ of intellect. The error is an enormous one. The chief component of mind is feeling." [35] What could be plainer than this? He also wrote, "That part which we ordinarily ignore when speaking of mind, is its essential part. The emotions are the masters, the intellect is the servant." What do words such as feeling and emotion mean unless instinct and intuition? All evidence is not of equal fixed value for the service of pure intellect. We naturally prefer some to other and we choose according to our instinct or feeling.

Some deny that intellect is subordinate to intuition and consider that they are thereby upholding the principles of modern science. They apply to the word intuition a superficial meaning, holding it equivalent to guessing in practical matters. Starting from this assumption,

they are able to dispose of Bergson's view to their own satisfaction. The last quotation, being from the writings of one of the leaders of modern scientific thought, is recommended to their notice.

We will now pass on to defend the principle of the discontinuity of intuition. It takes for granted, of course, the importance of intuition.

The reader may notice here a certain inconsistency on my part. He may say, 'Your whole effort seems directed to show the unity or continuity of life and now you are emphasising discontinuity.' I must therefore point out that I have upheld unity only as opposed to dualism.

It is true, in a sense, that all life is one, that there is no gap anywhere in it. Both a man and a protozoon are merely pieces of life, of consciousness, of intelligence, purpose or will, whatever we like to call it. This is perfectly plain, whenever we think unpractically, *i.e.* unintelligently, and it is probable that most of us think in this manner at times. But it is also true that life is not one but manifold, consisting of innumerable distinct things. The protozoon is utterly different from the man, and the parts of a man are innumerable and may be estimated in various ways, anatomically, chemically, psychologically. This we perceive whenever we review life practically, that is, intelligently, as during most of our waking hours. Both the unity and multiplicity of life were recognised long before scientific method came into vogue and science confirms this recognition more and more, for while it adds to the multiplicity by discovering new items and inventing new categories, it simultaneously confirms the unity, as for example when

it discovered that the cells of a man and of a plant divide in much the same peculiar and complex manner.

Hence, though monism and pluralism are in a sense opposed principles, they may belong to the mind of one consistent individual. But dualism is different, it is quite incompatible with monism. It sees everything double. It sees life and it imagines some agency, known or unknown, which works it. It is most important, at least for the teacher, to know whether science must always try to discover this imaginary agency, as a thing in itself.

It will now be evident that I have emphasised the unity of life only in opposition to this dualistic view. I am well aware that the pure monistic outlook, though fundamentally true, is neither practical nor intelligent—regarding intelligence as that by means of which we are practical.

We cannot be consistent monists and engage in life actively. We must admit multiplicity. We cannot speak of life otherwise. Words are separate things. We must therefore detach portions, in order to apply words to them. We may stand aside and regard evolution as a continuous becoming, but if we wish to speak of it we must regard it as discontinuous, as the becoming of new qualities, each distinct in itself. Otherwise speech is not applicable to it.

There is no doubt that biology will continue to regard organisms as combinations of distinct characters, at least superficially, characters which may be present in or absent from individuals. The utility of the method has been proved. *But if so, we cannot regard the human mind in any other way. We cannot regard it as a complex different from every other organic complex.*

I have no wish to urge the reality of discontinuity, but only the practical advantage and necessity of admitting it.

It is easy to argue that the three instincts defined above do not actually exist. For example, one might point out that no one is quite free from fetishism, that every one at times uses tangible objects in order to make some abstract idea more real and this is undoubtedly true. Similarly it might be argued that every one must think of the thing and its cause, and must therefore have some trace of the dualistic outlook. And the same argument is equally effective when applied to bodily characters. One may say that every stage between a blue eye and a brown eye might be found, that every blue eye must contain a minute trace of brown. But the answer to these arguments is always the same, viz., that for practical purposes it is well to consider these characters as distinct things. In spite of a possible trace of fetishism which may be in each one of us, it is practically true that few of us worship idols, and in spite of the general acquiescence in the so-called law of causation, it is practically true that some cannot imagine life to have a cause, apart from itself. This is what I mean by the practical reality of the second and third instinct.

Perhaps the reader will object on the grounds that characters are plain objective things, present in the organism at birth and constituting the marks of the species to which it belongs, utterly different from the vague shifting qualities, which are the basis of opinion. Against this I would urge that the terms birth, maturity, and species, though practically necessary, are purely

conventional. The history of the individual is continuous, from the union of its constituent germs until death. There is no moment in that history when new qualities must cease to unfold. And the concept of species is no less conventional. Every group of organisms appears polymorphic if examined closely enough. In defining a species, the naturalist, if dealing with a large number of specimens, must deliberately overlook certain minute points, otherwise he cannot continue his work of placing organisms in named groups.

Perhaps the reader will also object on the grounds that these so-called intuitions are communicable by imitation, whereas of course characters are not so. And here is, I think, the strongest objection. But we are coming to see more and more that instincts or modes of action are related to the organism in the same manner as are other objective characters. Teaching and imitation are now known to be of less importance in determining the quality of the organism and the modes of its behaviour, than was formerly supposed. It was long thought that birds taught their young to fly, until it was definitely proved that young birds could fly without being taught.

I do not wish to deny that imitation plays a very important part in human affairs, but instinct is, I believe, far more important. That repugnance which many have felt against tangible representation of the supernatural, and that other repugnance which some feel against imaginable or intelligent representation of the same, is instinctive. These repugnances are the expressions of definite mental qualities, which cannot in themselves be communicated from person to person by imitation and teaching.

The qualities may lie dormant in the mind without being expressed. It is the part of particular individuals to express in words and action the instinctive qualities which lie unexpressed in the minds of many of their contemporaries. The qualities themselves are not communicable but only the phrase, the particular means of expression, and hence the ability to express. Indeed, the same instinct may be expressed by quite different phrases.

It is obvious, however, that these qualities like all organic characters are distributed among individuals in varying quantity. Two individuals may have the same particular quality but in very different degrees.

It is interesting to notice that the validity of these principles seems to be already half admitted. Many examples might be quoted. Take the following passage—"The human mind alternately longs for and rejects finality." [36] But the same mind does not alternately long for and reject finality on the same day, although undoubtedly the same mind might at one time in its history long for finality and later on reject it. If the mind once rejects finality, it seldom longs for it again. What we actually observe around us, at the moment, is that some minds long for finality, while others reject it. That is to say some have the second instinct while others have the third.

Let us take another example of the half admission of these principles. It is well known that Huxley was not a staunch advocate of the selection theory. The fact was explained on the grounds that he had so little of "the naturalist's mood and experience." This explanation was

made and has been quoted with approval.[37] The fact cannot well be explained on the supposition that Huxley lacked the naturalist's experience, for at one time in his career, from 1846 to 1850, he had exceptional opportunity of acquiring such experience. We also know that many a man who lacked a tenth part of Huxley's general biological experience has eagerly accepted the selection theory. His lukewarm advocacy of the theory must therefore have been due to the fact that he lacked a certain mood, a mental peculiarity or instinct. We may call it the naturalist's mood if we wish, but let us not affirm that all students ought to have tnat mood. Hence, the most ardent selectionists admit that a man must have a certain instinct to enable him to accept the selection theory thoroughly; and surely this is an admission that the theory should not be taught as science, unless science is not to be for all. Must the teacher urge his pupils to strive and eliminate from their minds that 'mood' which belonged to Huxley, if they too possessed it?

There is an interesting reference to this subject in the writing of Kant. It appears that he considered these principles and rejected them, though not, as the context shows, very emphatically. He wrote, "We could never dispute with any one about that which merely depended on the manner in which he was organised."[38] But it seems to me that this is exactly what we do and that some persons recognise the fact. Furthermore, in that recognition, lies the whole motive of toleration.

Philosophical discord has aptly been described as a battle of phrases, but the quality of the mind, the ineradic-

able instinct alone determines that certain minds shall prefer certain phrases. How much more important the intuition is than the phrase is shown by the fact that the same instinct may be clearly expressed by two utterly different terminologies. This fact may be illustrated as follows.

'Let us suppose that there are two circles of disputants, each of course containing two factions. The dispute in one is theological, in the other biological. The one circle consists of theists and deists in conflict (see p. 91). The other consists of selectionists and anti-selectionists. A bystander would not at first notice that the two circles were engaged in the same dispute, because the terminology used would be utterly different in both circles. But when the disputants had exhausted all their technical terms, that is to say, when they came to speak of essentials, the bystander would hear the theists and the selectionists, though seated in different circles, expressing themselves in precisely the same phrases, which would run 'Your explanation, if you have one at all, is vague and therefore useless to us.' While the deists and the anti-selectionists, though seated in different circles, would also be expressing themselves in the same phrase, which would be 'Your explanation is much too obvious to satisfy us.' The bystander would thus discover that the real cause of the dispute was the same in both circles, and lay in the minds of the disputants, though hidden because expressed by different terminologies.

Dispute cannot of course be avoided, but if it depends on intuition it is just as unwise to be incensed with a man because of the diverse quality of his mind as to be incensed by the colour of his hair. With the

help of the same analogy we also see that it would be as foolish to abstain from expressing one's outlook, because it is eccentric, as it would be to conceal one's hair, when it is of an odd colour; and this must serve as my excuse.

REFERENCE TO QUOTATIONS

1. Quoted by G. H. Lewes—' A History of Philosophy '—Vol. I. Page 168.
2. C. Darwin—' Life and Letters '—Vol. III. Page 33.
3. E. W. MacBride—Review of ' Growth of Groups '—*Science Progress*, April, 1913. Page 659.
4. C. Darwin—' Life and Letters '—Vol. III. Page 349.
5. A. Weismann—Essay on the Selection theory—in ' Darwin and Modern Science '—Page 25.
6. H. Spencer—Essay on Feeling *v.* Intellect—in ' Facts and Comments '—Page 27.
7. H. F. Osborn—*American Naturalist*, Nov., 1897.
8. E. B. Poulton—*Science*, Oct. 15th, 1897.
9. T. H. Morgan—' Evolution and Adaptation '—Preface, page 1.
10. E. W. MacBride—Review of ' Growth of Groups '—*Science Progress*, April, 1913. Page 659.
11. H. Spencer—' First Principles '—Page 31.
12. H. Bergson—' Creative Evolution '—Page 53.
13. F. Nietzsche—' Thus spake Zarathustra '—II. XXXIV. 5 (Italics added).
14. G. I. Romanes—' Darwin and after Darwin '—Vol. I. Page 275.
15. H. Spencer—' First Principles '—Page 557.
16. T. H. Huxley—Essay on ' The Interpreters of Genesis '—in ' Contraverted Questions '—Page 96.
17. P. Geddes—Article ' Biology '—Chambers' Encyclopædia.
18. J. A. Thompson—' Darwin and Human Life '—Page 71.
19. H. Spencer—' Principles of Biology '—Vol. I. Page 445.
20. H. Spencer—' First Principles '—Page 102.
21. Hermann Lotze—' Outlines of Metaphysics '—Translated by G. T. Ladd.
22. M. Müller—' Anthropological Religion '—Page 19.
23. T. H. Huxley—Essay on ' The reception of the Origin of Species '—in ' Life and Letters of Darwin '—Vol. II. Page 199.
24. H. Spencer—' Essays: Scientific, Political, and Speculative '—Vol. I. Page 461.

25. H. Bergson—' Creative Evolution '—Page 108.
26. do. do. Page 91.
27. do. do. Page 94.
28. do. do. Page 94.
29. H. S. Jennings—' Doctrines held as Vitalism '—*American Naturalist*, July, 1913. Page 401.
30. Kant's ' Kritik '—Translated by M. Müller—Vol. II. Page 542.
31. Talavakara Upanishad—Sacred Books of the East—Translated by M. Müller. Khanda II. Verse 3.
32. H. Bergson—' Creative Evolution '—Page 174.
33. M. Müller—' Science of Thought '—Page 580 (Italics added).
34. C. Darwin—' Life and Letters '—Vol. III. Page 14.
35. H. Spencer—Essay on ' Feeling *v.* Intellect '—in ' Facts and Comments.' Page 25.
36. G. H. Lewes—' A History of Philosophy '—Vol. II. Page 208.
37. J. A. Thompson—' Darwin and Human Life '—Page 72.
38. G. H. Lewes—Criticism of the Kritik—' A History of Philosophy ' Vol. II. Page 477.

THE END

PRINTED BY WILLIAM CLOWES AND SONS, LIMITED, LONDON AND BECCLES.

THE GROWTH OF GROUPS IN THE ANIMAL KINGDOM.

By R. E. LLOYD, M.B., D.Sc.

8vo. Price 5*s*. net.

SOME PRESS OPINIONS.

"Mr. Lloyd here expresses his own personal views, as an exponent of the Mutation theory of De Vries, with acuteness and knowledge."—*The Times.*

"An unprejudiced naturalist will derive nothing but pleasure from this temperately written and well-reasoned volume. . . . To many readers, we think, his suggestions will be of the greatest interest."—*Athenæum.*

"His views are clearly and modestly put forward, and his book is worth careful attention."—*Nature.*

"We mentioned at the outset that we do not think that Mr. Lloyd had solved the problem of the origin of species. . . . Mr. Lloyd's philosophical reflections are clothed in what he imagines to be an epigrammatic style."—*Science Progress.*

"Lloyd's distinctive contribution is the demonstration that there exist in certain wild organisms the same conditions that are found in experimentation."—*The American Naturalist.*

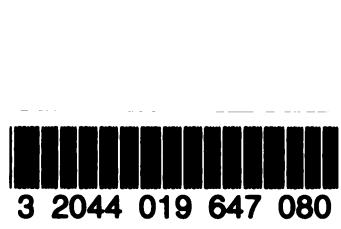
"The volume itself is a model of fine bookmaking."—
The Nation (New York).

"The book is a substantial contribution to the literature of evolution."—*The Dial* (New York).

"The author attempts to ridicule and discredit the theory of natural selection by the coining of cheap phrases."—
Indian Medical Gazette.

"This is a very interesting volume."—
Australian Medical Gazette.

LONGMANS, GREEN AND CO.
LONDON, NEW YORK, BOMBAY, CALCUTTA, AND MADRAS


3 2044 019 647 080

This book should be returned to the Library on or before the last date stamped below.

A fine is incurred by retaining it beyond the specified time.

Please return promptly.

WIDENER

APR - 1 1993

BOOK DUE